This is to certify that the

thesis entitled

Assessing Behavior Change Towards Groundwater Stewardship In Adults After Attending A Home*A*Syst Program

presented by

Kristin L. Linderman

has been accepted towards fulfillment of the requirements for

M.S. degree in Extension Education

Major professor

Date August 10, 2001

ASSESSING BEHAVIOR CHANGE TOWARDS GROUNDWATER STEWARDSHIP IN ADULTS AFTER ATTENDING A HOME*A*SYST PROGRAM

By

Kristin L. Linderman

AN ABSTRACT OF A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Agriculture and Natural Resources
Education and Communication Systems

2001

Professor Dr. Murari Suvedi

ABSTRACT

ASSESSING BEHAVIOR CHANGE
TOWARDS GROUNDWATER STEWARDSHIP IN ADULTS AFTER ATTENDING
A HOME*A*SYST PROGRAM

By

Kristin L. Linderman

In the year 1999 alone, over 145,000 people nationally were reached by a groundwater education program called Home*A*Syst (HAS). The national HAS program began in the 1980's and Michigan joined in the efforts in the early 1990's. To date, there has not been a comprehensive study of the HAS program in Michigan. This study focuses on what types of changes people are or are not making because of the HAS intervention. In addition, who is the audience attending the programs and is the message consistent.

Indications from this study suggest that those who already have a propensity towards groundwater quality education are those that are attending the Home*A*Syst programs. As well, a change in behavior was statistically noted on several questions which seems to indicate that the Michigan Home*A*Syst program is providing education to Michigan residents.

The majority of the posttest respondents indicated that they have a better understanding of pesticide and fertilizer usage, storage, and disposal, effects of behavior on groundwater quality, and seem more empowered when it comes to improving groundwater quality or preventing groundwater pollution.

This thesis is dedicated to Andrew Esch, who provided me with endless support throughout this process.

ACKNOWLEDGEMENTS

For me the process of obtaining my masters degree has been a great learning, developing, and growing period. Without the assistance of several people, this accomplishment would not be as powerful as it turned out to be. First and foremost, I would like to thank my thesis committee, Dr. Murari Suvedi, Dr. Robert Holsman, Dr. Janet Lillie, and Dr. Kirk Heinze. A special thanks to Dr. Murari Suvedi, my major professor, who provide me with guidance, encouragement, and support throughout my endeavor. Appreciation is extended to Dr. Janet Lillie for joining my committee and providing valuable ideas and insight to my project and to Dr. Kirk Heinze for his important and helpful editorial input. My sincere appreciation goes to Dr. Robert Holsman. Dr. Holsman became my friend and my mentor. Thank you.

In addition, I would like to thank Dr. Joe Levine for always keeping his door and his listening ear open. Dr. Levine enabled and encouraged me to grow in many different directions, thanks Joe! Also, my gratitude is extended to Dr. Dave Krueger and Patty Farrell.

A big thank you to those who provided additional assistance with my project from MDA and MSUE, including Allen Krizek, Rob Glazier, Jack Knorek, Roberta Dow, and all the 2001 Americorps members.

Finally, I would like to thank my family and the Esch family for the many things they have done over the years that allowed me to get this far.

TABLE OF CONTENTS

CHAPTER IV
FINDINGS

CHAPTER V
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

APPEN

REFER

APPENDICES

LIST OF TABLES

LIST OF

LIST OF FIGURES

C

resources.

resulting i

abundance

help incre

focused or

(HAS).

The

potential r

quality. H

Michigan.

education t

assessment.

whether or

being put in

the direction

CHAPTER I

INTRODUCTION TO THE STUDY

Introduction

Changes in the way and how much people use the environment's natural resources, have been occurring more frequently over the course of the past few decades, resulting in a higher number of negative impacts on the environment. As a result, an abundance of environmentally focused educational programs have been developed to help increase awareness of these changes as well as to reduce further damage. This study focused on one environmental education program in particular called Home*A*Syst (HAS).

The Home*A*Syst program concentrates its efforts on educating homeowners of potential risks that are in and around their home that could compromise groundwater quality. HAS is a national program, however, this study strictly focuses on HAS in Michigan. The Michigan HAS project has been promoting groundwater quality education to homeowners for over seven years without a comprehensive needs assessment. Evaluation of this program is imperative in understanding, most importantly, whether or not the messages have reached homeowners and if so, are these messages being put into practice. The information gathered through this study would help guide the direction of HAS as well as help develop future programs.

Background

Awareness of water quality issues, drinking water sources, and local water resources are issues that affect each person and all people should be aware of these issues (Suvedi, Krueger, Shrestha, and Bettinghouse, 2000). A recent study assessing Michigan citizens' knowledge and perception about groundwater and issues associated, discovered that most people had a good understanding of groundwater in Michigan. On the other hand, most respondents were unaware of such important aspects of groundwater such as how much of the earth's water that is available for drinking, and the average amount of water an American uses every day (Suvedi et al., 2000, and Holsman, Linderman, Krueger, and Suvedi, 2000). In other words, people generally understand where groundwater comes from and how it gets there, but they do not understand how it is being affected or used. Considering the limited supply of this natural resource, and the lack of knowledge and understanding of groundwater usage and affects people have on it, the need for groundwater education programs is crucial.

Over the past seven years in Michigan the Home*A*Syst (HAS) program has been attempting to educate homeowners on the risks of groundwater contamination. Specific objectives of HAS are to help facilitate groundwater education and to provide information about groundwater risks that will allow the individual homeowner to assess a situation on their own with the aid of a manual after an initial consultation. The HAS manual provides specific details about particular risk categories as well as how to lower risks (Home Assessment Guide, 1999). Each HAS program is provided to help assist participants with groundwater education. In other words, basic information is provided

that will help the participant understand what groundwater specifically is, where it comes from and what types of risks are in and around their home that are associated with groundwater. The manual is a supplement to the personal training to help the participants engage in their own risk assessment when they are at home. Participation in the HAS program is expected to help homeowners in these six specific ways:

1. Protect your drinking water well.
2. Learn the basics about your home septic system.
3. Reduce runoff, which may harm lakes and streams.
4. Gain information on the health and environmental impact of your yard and gardening activities.
5. Lower risks from hazardous household products.
6. Safely manage liquid fuels and their storage (gas, fuel oil, kerosene). (Home Assessment Guide, 1999).

A comprehensive study that examined the extent to which HAS affects the knowledge, attitude, and behavior changes of the homeowners would allow those who administer the programs to establish which teaching tools and methods are effective, which ones need to be fined tuned, and which are just not working at all. Do participants change as a result of the training they receive? Have homeowners developed an awareness of groundwater issues? Have homeowners acquired the skills and knowledge necessary to be good stewards? Do the homeowners adopt safer groundwater practices? These issues are very important for those involved with HAS groundwater education.

In order to understand whether or not these questions can be answered, understanding what drives positive environmental behavior is important. The possession

of particular traits must accompany any type of change through education in order for that change to affect a person's behavior.

It is expected that empowerment, a personal sense of being able to make a change, will have a positive affect on behavioral change in regards to groundwater risk issues. It is also expected that ownership, a personal investment in an issue, will have a positive affect on behavioral changes in regard to groundwater risk issues. The ability to affect these two variables and to change behavior towards groundwater issues will allow for the evaluation of an intention to act. In other words, if the variables empowerment, and ownership are positively influenced it can be determined to what extent an individual will take action towards implementing safe and preventative groundwater practices and becoming an environmentally responsible citizen. An environmentally responsible citizen can be operationally defined as one who possesses these five traits:

1. An awareness and sensitivity to the total environment and its allied problems and /or issues.
2. A basic understanding of the environment and its allied problems and/or issues.
3. Feelings of concern for the environment and motivation for actively participating in environmental improvement and protection.
4. Skills for identifying and solving environmental problems and/or issues.
5. Active involvement at all levels in working toward resolution of environmental problems and/or issues.
   (Hungerford et al., 1990, p. 9)

Statement of the problem

To date there have been no comprehensive studies of the Michigan HAS program. This is a problem for several reasons, first, Home*A*Syst is a grant based system. Without evaluation of the program to provide stakeholders with evidence that HAS is

continuing to provide Michigan residents with groundwater education, there will not be funds available to continue the program. Second, without knowledge of successes or failures in the system, there cannot be improvement or understanding of the current status of groundwater education. Finally, it is imperative to have knowledge of the type of audience that is actually being accessed with the current program. Due to the voluntary nature of the program, is it unclear if HAS is targeting those whom already have a propensity towards groundwater education or if the program is reaching all facets of Michigan residents.

Need for the study

According to Magnus et al. (1997) the most important goal of environmental education is to find practical solutions to environmental issues to create positive environmental behavior. In order to assess this goal it is imperative to understand if this is what is really happening in a particular program.

Over the course of the seven years that Home*A*Syst has been educating homeowners about groundwater, there has not been a study that focused solely on identifying whether or not the program is actually meeting the intended goal of behavior change. This is not only the case in Michigan, but also in the thirty-seven other states that HAS is being implemented. A few studies have evaluated the program participants to determine if they intend to make physical changes around their home and property as a result of the assessment, but this is a weak approach and cannot determine attitudes, knowledge levels, or behavior changes. Other studies attempted to evaluate knowledge change, but recent research has suggested that educating people to become more

2
5

know

behav

be deter

in behav

1.

2.

3.

A

h

B

c

E

h

E

t

b

p

knowledgeable about the environment and its issues is not sufficient by itself to change behavior (Hungerford et al., 1990, Pooley et al., 2000, Savina, 1997). Therefore, it must be determined what it is about the assessments that may or may not be causing a change in behavior vis-a-vis causing or preventing a positive environmental action.

Objectives

1. Assess what type of audience is being reached by the Home*A*Syst program.
2. Determine if pesticide, fertilizer, and groundwater messages are expressed through the HAS program.
3. Determine whether or not the audience makes behavioral changes due to the HAS program messages.

Definition of terms

Americorps Member: A person that provides a domestic Peace Corps service that helps to strengthen communities through national service programs.

Behavior change: A personal decision to alter an existing behavior in order to comply with the new desired behavior.

Empowerment: "giving human beings a sense that they can make changes and help resolve important environmental issues" (Humerford et al., 1990, p. 12).

Environmental education: The interdisciplinary process of developing a citizenry that is aware of and knowledgeable about the total environment, in its natural and built aspects, that has the capacity for, and the commitment to engage in inquiry, problem-solving, decision-making, and action that will assure environmental

study: I

to instruc

Americo

consent f

2) The p

participar

pressures

"supposed

enough ti

urgency.

minutes w

quality (Marzek, 1993, p. 11).

Michigan Groundwater Stewardship Program: A program that provides information and tools for pesticide and fertilizer users in order to help them identify potential risks to groundwater associated with the pesticide and fertilizer use.

Ownership: Having a personal interest in an environmental issue.

Home*A*Syst: A national program that strives to educate homeowners about the potential risks to groundwater.

Participants: Those people that choose to take part in a Home*A*Syst program.

Assumptions

There are five guiding assumptions that must be made when considering this study: 1) The Americorps Agents will hand out the pretests to the participants according to instruction in all appropriate Home*A*Syst programs. A letter was sent to the Americorps agents along with the consent forms and pretests that explained how the consent forms and pretest must be delivered to the HAS participants (see Appendix B). 2) The participants will answer all questions truthfully. It is assumed that each of the participants will answer all of the pretest and posttest questions without regard to social pressures. Some people have a tendency to answer in a way that they feel they are "supposed" to answer according to social norms. 3) The participants will be given enough time to finish the pretests prior to the HAS program without the pressure of urgency. Each HAS program lasts a different length of time. Some may last twenty minutes while other may last a couple of hours. Urgency to complete the questionnaires

2
5

in a time

limited a

Americ

protests to

was orig

forms an

April 30

30. 5) O

fill out a p

presentati

in a timely manner may be due to pressure from the Americorps agent because of a limited amount of time to present, or because there is a large amount of material that the Americorps agent feels they need to cover. 4) The Americorps agents will return the pretests to the researcher in a timely manner, guided by a previously set time frame. It was originally assumed that the Americorps agents would send in the completed consent forms and questionnaires by March 31, however, as the collection date was extended to April 30 it was expected that the completed forms would be returned no later than April 30. 5) Only those participants that did partake in a group Home*A*Syst program will fill out a pretest. It was assumed that no children under the age of eighteen or one on one presentation participants would fill out a consent form and pretest.

CHAPTER II

REVIEW OF LITERATURE

Establishing an understanding of Home*A*Syst, MGSP, and environmental education in accordance with groundwater education, will help to bring together a clear vision for the direction of this study.

Environmental Education

It has not been until the last few decades that people have seen global ramifications due to environmental destruction. For example, the Cuyahoga River in Cleveland caught fire as a result of pollution (Chafee, 1995). "Forty percent of our rivers and lakes are not suitable for drinking, fishing, or swimming. In Milwaukee in 1993, hundreds of thousands of people got sick form contaminated drinking water; 100 died" (Browner, 1995).

Most people believed that there was an abundance of resources that allowed for unlimited use and abuse (Trisler, 1993). Because of the additional burdens put on the environment from chemicals, increased use of resources, and an ever-growing population, environmental education has become an important vehicle for alleviating negative human impacts on environmental quality. As such, environmental education (EE) has only recently begun to be a focus of enough concern to warrant an increase in research.

Environmental education has been defined in many ways. For the purposes of this study EE is defined as "the interdisciplinary process of developing a citizenry that is

aware of and knowledgeable about the total environment, in its natural and built aspects, that has the capacity for, and the commitment to engage in inquiry, problem-solving, decision-making, and action that will assure environmental quality" (Mrazek, 1993).

In 1990, the National Environmental Education Act was developed. This Act was created to "strengthen and expand environmental education as an integral part of the" Environmental Protection Agencies (EPA) whose mission is to protect the environment (NEEAC, 1996). The purpose was to develop a program that provided guidance to the local and state agencies and governments to help them build and sustain environmental education programs (NEEAC, 1996).

Non-formal environmental education activities aimed at adults usually target solutions to specific environmental problems, but the challenge generally is, how to best reach a non-captive audience with a meaningful and effective program (NEEAC, 1996). Chaffee (1995) states that by using an expansive interdisciplinary approach, providing a less structured environment as well as involving the community, people can be more informed to make decisions based on science, not on arbitrary announcements. According to Carol Browner (1995), an informed and involved community always has a better understanding of what types of environmental education are best suited for their area and they also do a better job of environmental protection. This is why Congress, when creating its National Environmental Education Act, implemented by the EPA decided that there must be involvement at the state and local level in the programs developed.

A

the Amer

and impl

challenge

a very im

understan

them. A

concernin

two out of

environme

underscore

to convey

ability to a

solutions t

(NEETF R

nation, the

their envir

myth answ

environme

environme

"E

Pro

Environmental Literacy

According to the National Environmental Education Advisory Council (NEEAC), the American public "lacks sufficient knowledge, skills, and motivation to understand and implement the kinds of solutions needed to address today's environmental challenges" (1996, p. i). Mainstream America's understanding of environmental issues is a very important concern when discussing environmental education. Educators must first understand the level of knowledge that their audience has before attempting to educate them. A 1998 NEETF/Roper Survey discovered that there is "persistent misinformation concerning the environment in America". The 1998 NEETF/Roper Survey found that two out of three American's failed to correctly answer nine or more simple environmental questions out of twelve. This lack of information can potentially underscore more immediate awareness and skills that environmental educators are trying to convey. The lack of public environmental knowledge has thwarted policy makers' ability to address important environmental issues, as well as made it difficult to achieve solutions to problems due to the fact that the public is not aware real issues (NEETF/Roper Survey, 1997). Using a quiz style survey distributed in 1998 across the nation, the NEETF/Roper Survey discovered that while most Americans felt confident of their environmental knowledge a majority of the survey respondents gave the incorrect myth answer. It became increasingly clear that educators needed to increase environmental literacy in the American public. UNESCO/UNEP (1989) define environmental literacy as follows:

> "Environmental literacy should be basic functional education for all people, which provides them with the elementary knowledge, skills, and motives to cope with

environmental needs and contribute to sustainable development. Achieving environmental literacy entails a systematic approach to articulating the purpose of education, defining objectives, redesigning curriculum and institutional programs, and evaluating results. Within this framework, approaches to teaching and learning are fundamental".

In a comparison study between the current status of environmental education and the ideal aims and goals of environmental education done by Volk and McBeth (1996), the overall measure of environmental literacy was moderate to low. This suggests that the environmental education programs are not meeting their goals. Lack of success was attributed to efforts to increase attitudinal dimensions of environmental literacy (Volk et al., 1996). Volk and McBeth (1996) go on to say that scientific and ecological concepts by themselves will not provide the learner with enough to understand societal implications, use of instructional methods and models that develop knowledgeable and thinking individuals that are willing to make decisions in their personal lives as well as society. In addition, the specific environmental education program must be an on going process that allows individuals to integrate the information into their working knowledge (Volk et al, 1996).

Environmental literacy is a very complex discipline. With so many components to environmental education, the fact that educational programs are not meeting their goals may be in part because educators do not know to make EE meaningful for the learner (Trisler, 1993). An environmental educator needs to learn to balance personal needs of the learner with their environmental message. Needs and wants are increasing in today's

society, t

incorpora

C

topic of r

of enviro

with attit

It was bel

attitudes.

Rickson, 1

challenged

that know

behavior ch

related to a

however, m

change.

Wha

Studies hav

impact of sp

indicators o

Schettino, 1

Lansana, 19

society, thus careful consideration must be taken by the educator to understand and incorporate those needs and wants with environmental education.

Responsible Environmental Behavior

Changing adult learner behavior through environmental education has been a topic of research for many years based on the need to help combat the growing severity of environmental degradation. In earlier years, traditional thinking linked knowledge with attitudes and attitudes with behavior (Hungerford et al., 1990, Pooley et al., 2000). It was believed that if knowledge could be increased then this would increase positive attitudes, in turn leading to action towards better environmental quality (Ramsey and Rickson, 1977, Pooley et al., 2000). However, this simplistic linear model has been challenged over the years. Research that is more recent has brought to attention the fact that knowledge appears to simply be a prerequisite to action, it is not the main cause of behavior change (Hines et al., 1987). It is true that at least some portion of knowledge as related to a particular environmental issue must be known before an individual can act, however, much more is needed in addition to knowledge in order to lead to a behavior change.

What is it that drives people to behave in an environmentally responsible way? Studies have shown that environmental knowledge, locus of control, and awareness of the impact of specific environmental behaviors as well as social context are the biggest indicators of responsible environmental behavior (REB) (Grob 1995, Borden and Schettino, 1979, Vining and Ebreo, 1990, Oskamp et al., 1991, Schultz et al., 1995, Lansana, 1993, and Derksen and Gartrell, 1993).

Results from a meta-analysis of 128 studies by Hines et. al (1986/87) indicated that the following variables were associated with REB: 1) expressed intention 2) locus of control 3) attitudes 4) personal responsibility and 5) knowledge. A model was also developed through the meta-analysis, which described the above variables interactions:

1. It appears that intention to act is merely an artifact of a number of other variables acting in combination (e.g. cognitive knowledge, cognitive skills, and personality factors).

2. Before an individual can intentionally act on a particular environmental problem, that individual must be cognizant of the existence of the problem. Thus, knowledge of the problem appears to be a prerequisite to action.

3. An individual must also possess knowledge of those courses of action which are available and which will be most effective in a given situation.

4. Another critical component ...is skill in appropriately applying this knowledge to a given problem...despite the fact that a skill variable was not... meta-analyzed.

5. In addition, an individual must possess a desire to act. One's desire to act appears to be affected by a host of personality factors. These include locus of control, attitudes, personal responsibility.

6. Situational factors, such as economic constraints, social pressures, and opportunities to choose different actions, may ... serve to either counteract or strengthen the variables in the model. (Hines et. al, 1986/87)

From this meta-analysis of REB, Hungerford and Volk (1990) surmised that there are three variables that would lead to REB, entry-level variables, ownership variables, and empowerment variables. These three variables include the above indicators as well as others are described in detail below.

A model (see Figure 1 in Appendix E) provided by Hungerford and Volk (1990) explains a recent perspective for behavioral change. Contributions from studies that examined REB as well as the model developed by the Hines et al. (1986/87) meta-

analysi

behavio

than th

variabl

examp

environ

and att

owners

of the

most p

HAS is

already

attitud

homeo

around

Prograr

analysis, "revealed that there are probably three categories of variables that contribute to behavior" (Hungerford et al., 1990). These three variables are:

1. Entry Level Variables
2. Ownership Variables
3. Empowerment Variables

These three variables also act in a linear manner, however, it is more complex than the earlier models. Each variable has a subset of variables (called major and minor variables) that usually need to be present to influence the next main variable. For example, the main variable "Entry Level" encompasses one major variable, environmental sensitivity, and three minor variables, knowledge of ecology, androgyny, and attitudes toward pollution, technology, and economics. The model suggests that ownership of a given environmental problem and its solution depends on the combination of the three variables, entry-level, ownership, and empowerment, acting in concert.

In regards to the Home*A*Syst groundwater education program it is assumed that most people come into the assessments with the "Entry Level" variables already intact. HAS is a voluntary program which is why there is the assumption that the participants already possess the entry level variables such as environmental sensitivity, and positive attitudes about the environment.

Home*A*Syst (HAS) is a program that was developed to help educate homeowners about potential risks associated with pollution sources that exists in and around their home as it pertains to groundwater (Home Assessment Guide, 1999). The program focuses on three objectives:

1. Identify environmental risks, concerns or problems in or near the home.

2. Learn how to better manage home and property and how to find further information.

3. Take preventive actions to safeguard your health and the environment.

Currently it is important to decipher whether or not "Ownership" and "Empowerment" variables are incorporated into the HAS programs. Empowerment is defined as "giving human beings a sense that they can make changes and help resolve important environmental issues" (Hungerford et al., 1990, p. 12). According to Hungerford and Volk (1990), empowerment is crucial for the training of responsible citizens in the environmental dimension. They go on to say that as crucial as this step is for behavior modification, most educators fail to develop this attribute in their educational practices.

The Ownership variable is also important because it gives the HAS participants a personal investment in what they are learning. Ownership is defined as having a personal interest in an environmental issue. This is important because when an issue becomes personal, it causes individuals to seek and understand the situation as well as become something like a stakeholder in the issue. Then it is more likely that behavior will change and action will be taken. In studies done by a variety of different researchers, when positive behavior change was an outcome it was due to instruction that focused on ownership and empowerment (Hungerford et al., 1990).

Michigan Groundwater Stewardship Program

The Michigan Groundwater Stewardship Program (MGSP) is a project focused on providing tools and information to help people identify risks to groundwater

associated with their pesticide and fertilizer use. The program strives to help reduce these risks while maintaining a focus on "real world" financial and technical constraints.

Many local programs are funded and sustained through MGSP such as commodity programs, Farm*A*Syst, Field*A*Syst, Groundwater Stewardship Teams, and, Home*A*Syst.

The majority of these programs are funded through a specialized tax on pesticides and nitrogen fertilizers. A registration fee is added to those companies that wish to license their product for use in Michigan, and that accounts for approximately 72% of the revenue by nitrogen fertilizer (Funding: Michigan Groundwater Stewardship Program, n.d.). In the case of pesticides, household products generate close to 40% while the rest is attributed to agricultural use (Funding: Michigan Groundwater Stewardship Program, n.d.).

*Home*A*Syst*

Home*A*Syst is a national program jointly supported by the United States Department of Agriculture, Environmental Protection Agency, Natural Resources Conservation Service, and the Cooperative State Research, Education and Extension Service. HAS began in the 1980's and currently 37 states across America participate in the program.

Michigan HAS is currently in its eighth year and has the highest budget of all the state programs due to a tax on both farm and residentially used pesticides and nitrogen fertilizers. Because HAS is supported by money from taxes on the pesticides and fertilizers, as well as being supported by the MGSP, the focus of the Michigan HAS is on

2.
5

groundwa
HAS prog
as at a fai
requested
participa
that are
such as
as well

provid
countie
the Ar
meet t
progra
which
Asse
diffe
varia
grou

nee
attit
the

groundwater risks in and around the home associated with pesticide and fertilizer use. A HAS program is administered to an individual, groups, or through demonstrations, such as at a fair or exposition. HAS is a voluntary program that provides a service when requested by one or more participants. The goal of each program is to provide the participants with a general overview of risks to groundwater in and around their home that are associated with pesticides and fertilizers. In addition, other environmental risks such as managing household trash, storm water management, managing septic systems, as well as others may be part of the HAS presentation.

Currently, there are nineteen Americorps Agents around the state of Michigan that provide HAS programs on a full time basis. Each agent has an area on average of three counties in which they travel to provide the groundwater education services. At this time, the Americorps have the freedom to develop individualized methods for their programs to meet their local environmental education needs. Additionally, some of the HAS programs do not provide groundwater education as it relates to pesticides and fertilizers, which is the main focus of HAS. One cause of this may be because the Home Assessment Guide (supplement manual) has eight different chapters, each providing different environmentally focused information. Another cause may be due to the variances in audience. Some groups may be interested in pesticide and fertilizer risks to groundwater while others may not.

In response to the non-standardized delivery methods and a critically needed needs assessment, a study was done by Holsman (2000) comparing knowledge and attitudes of HAS participants and a random sample of Michigan residents. In addition, the study aimed to assess the different information delivery strategies employed by the

Americorps agents. The study indicated that the HAS participants had fairly high levels of groundwater literacy and stewardship behaviors as compared to the sample of Michigan residents (Holsman, 2000). As was asked in the Holsman (2000) study, is this difference of knowledge and pro-environmental behavior a result of the HAS program? This question could not be answered, thus the recommendation from Holsman was "to develop a more stringent, experimental design to test for differences in pre- and post-intervention scores on knowledge and behavior items" (Holsman, 2000, p. 15).

*Home*A*Syst and Environmental Education*

As is true with most educational programs, an environmental education program can only be as effective as its implementation and follow-up (Ruskey, 1995). Therefore, the Home*A*Syst program must be closely administered and evaluated, otherwise the citizens do not receive maximum benefit and the funding and other support is no longer there.

As stated previously, the purpose of Home*A*Syst is to educate homeowners about groundwater issues in and around their home. When discussing homeownership it is commonly known that the home is one of the largest investments that people make. This fact alone usually substantiates why people may have ownership with the groundwater issue. If a person does not feel ownership towards this issue thus far, HAS provides materials that tries to explain and develop why homeowners should have ownership to this issue. For example, "knowing about potential risks or problems can help prevent costly cleanups, repairs, and legal troubles" as well as protecting your family and yourself from harmful contaminants in your drinking water (Home

Assess

proper

becaus

proper

or oth

charac

enviro

Assum

and ov

enviro

variab

enviro

help r

relatio

likeli

partic

behav

to eac

under

an in

Assessment Guide, 1997). In addition, it is good to not only take care of your own property but also to make sure your neighbors are using good management practices, because property values and tax burdens can be affected by pollution problems on your property and in your neighborhood or city. As well, taking steps to cut your use of water or other resources can save you money (Home Assessment Guide, 1997).

An environmental education program that encourages any or all of the characteristics of the variable model will have a higher expectation to create environmentally responsible behavior (Hungerford et al., 1990; Negra & Manning, 1997). Assuming that the HAS program participants already have some or all of the entry level and ownership variables the focus on empowerment is essential to this study.

The major sub-variables of empowerment are knowledge of and skill in using environmental action strategies, locus of control, and the intention to act. The minor sub-variable is in-depth knowledge about issues. Knowledge of and skill in using environmental action strategies gives a person the perception of wielding the "power" to help resolve environmental issues. Intention to act is believed to share a synergistic relationship with the latter two variables. If the person intends to take action, then the likelihood of that action actually happening is increased. Locus of control in this particular model is defined as the expectation of success or reinforcement for a person's behavior (Hungerford et al., 1990).

One important part of the HAS program provided to groups is a manual supplied to each individual. The manual contains essential topics that every homeowner should understand along with worksheets that should help with understanding risks that apply to an individual's situation (Home Assessment Guide, 1997). Normally a portion of the

manual

strong

with th

the ab

action

an emp

know

manip

make

gath

One

resp

the

Am

Pest

Pol

Dri

abo

NE

manual is discussed and demonstrated to the assessment participants. It is then with strong optimism that this has provided the individuals the ability to go home and continue with the rest of the manual at their own pace. For one, by providing the participants with the ability through a take home manual to use their new knowledge and skills to take action and implement the new environmental action strategies at home, on their own, has an empowering quality. A second intention of the assessment is to provide in-depth knowledge of groundwater risks. A locus of control in this case may not be manipulatable, however, reinforcement of a positive outcome due to changes a person makes could provide enough incentive to take action.

Groundwater Education

The 1997 NEETF/Roper Starch Worldwide Survey is a culmination of data gathered over a six year time period that obtained Americans' views of the environment. One particular area of interest was that of water knowledge. "Nearly half (of survey respondents) think the leading cause of water pollution is factories. Pollution running off the land (our leading problem) is not identified by four of five Americans. A majority of Americans think the water utilities routinely test for these pollutants (animal waste and pesticides), when only a few test for these pollutants" (NEETF/Roper Survey, 1997).

It is clear that Americans do not understand the source nor the impact of water pollution. Over the course of the twenty-five years since the inception of the Safe Drinking Water Act, unprecedented amounts of new information are becoming available about drinking water (NEETF/Roper Survey, 1998). However, the results of the NEETF/Roper water survey found that most Americans are not aware of their water

sources n

demonstr

percentag

T

their tap v

informati

these sou

groups w

to take ac

a mail su

affect tha

affecting

(Suvedi, e

H

the poten

fertilizers

being one

the taxes

people w

that a stud

adopted n

sources nor the threats to those local water sources. In addition, although Americans demonstrated a basic trust of their public drinking water supplies, there was a high percentage of respondents that either boil their tap water or use bottled water.

The 1998 NEETF report also found that the public wants more information about their tap water and said they will use it; they want to act. Some of the ways that water information is disseminated is through the media, government, and water companies, but these sources were considered to be the least credible. Environmental or public interest groups were thought to be more credible. Therefore, more water education groups need to take action and start getting information out to the people.

In Michigan, a baseline study, which first polled Michigan residents using a mail survey in 1996 and again in 2000, discovered that most people are aware of the affect that land use has on groundwater, however, people perceived a lower risk of affecting groundwater quality from land use around their own homes and property (Suvedi, et. al in 2000).

Home*A*Syst (HAS) is a national program that strives to educate people about the potential risks to groundwater, specifically those risks relating to pesticides and fertilizers. Currently HAS is operating in 37 states across the United States, Michigan being one. In Michigan the ability to provide more money to the HAS program due to the taxes on pesticides and fertilizers means that there is the potential to reach more people with groundwater education. One problem faced by the HAS educators is the fact that a study done in 2000 indicated that HAS may be reaching those that already have adopted many of the practices (Holsman et al.). The program does not seem to be

branching out to the Michigan residents that really need, and according to the NEETF report, want the information.

The focus then of this study is twofold. First, to identify whether or not a diverse sector of Michigan is being reached by the HAS program and second, of those people being reached, what is their level of behavior change.

CHAPTER III

METHODOLOGY

Through observation of Home*A*Syst programs, expert assistance, and prior studies, a pretest and posttest was developed that attempted to enable the researcher to understand to what degree participants are both coming in with, and acquiring, knowledge, empowerment, and ownership of groundwater stewardship issues.

Following analysis of the data from the pretest and posttest, results will be used to assist in the development of future HAS programs.

Design of the Study

The study applied a quasi-experimental pretest posttest comparison group design. Specifically, the approach utilized multiple measures comparing intact groups. In other words, because there cannot be randomization, different intact groups that have similar characteristics were compared. Pretest surveys were delivered to each Americorps agent for them to distribute prior to each HAS program. Posttests were then mailed to the same participants from the original pretest programs.

Population and Sample

The target population of the study included current HAS participants. More specifically, those participants that chose to attend an HAS outreach during March and April of 2001.

Due to the voluntary nature of the Home*A*Syst program, the researcher did not have the capability to randomly choose the sample from the population. It would

otherwise have been very difficult to acquire a large enough random sample of the target population. A total of 146 pretests were returned which made up the sample. Ten surveys were deemed unusable because the HAS program was delivered by someone other than an Americorps member, eleven pretests were returned after the cut off date, and twenty-two respondents did not fill out a consent form. This brought the total of posttests to be sent out to 124.

A total of 79 usable posttests were returned, yielding a return rate of 64%. Of the non-usable posttests, one was returned incomplete, another was returned having been filled out, but by a person who indicated they had not gone to a Home*A*Syst program, and six packets were returned undeliverable.

Traditionally, a program takes place when a group or individual requests an HAS educator (usually an Americorps agent) to provide one. This is usually based upon word of mouth and the reputation of the Home*A*Syst program in that particular area as well as awareness of HAS through local fairs and expositions.

Although random assignment of subjects to groups is the ideal, in this case, problems with acquiring a random sample for the purpose of presenting the groundwater information is not practical. Intact groups such as Rotary Clubs, Sierra Clubs, Women's Clubs, Kiwanis Clubs, and so on, are the only efficient way to gather a group of people in order to present a Home*A*Syst presentation.

Sample size depended on each program's attendance. Individual program attendance depended on three factors: 1) the relevance of the HAS program to a specific intact group affected how many people associated with that group decided to attend the

program 2) the time of day and week that the program was offered 3) reputation of the program in that particular area.

Although group presentations are not the only way that Americorps agents get their message out, as information is shared through one on one home visits, fairs, and expositions, due to sample size issues presentation consistency issues, and ease of contact for follow up posttests, the intact group was the only effective manner in which to gather data for this study.

In order to contact the program participants for posttest purposes, a voluntary consent form (see appendix) was given to the participants (at the same time as the pretest) that provided a place to write in their address. This eliminated any connection of the questionnaire to the participant by keeping all names and addresses off of the questionnaire. In addition, by providing the participants the understanding that they will be receiving a posttest in the near future regarding HAS, the researcher believed that it would help obtain a higher return rate. All of those participants that wrote in their name and address on the consent form did receive a posttest.

Instrumentation

Data was gathered using pretest and posttest questionnaires following recommendations from Salant and Dillman (1994).

Three Americorps members delivered the pilot test. The pilot tests were handed out to the participants by the Americorps member prior to the HAS program, collected, and sent back to the researcher. A total of thirty pilot tests were returned to the

researcher. Based on the results of the pilot test, the pretest and posttest items were developed.

The pretests were kept short due to time constraints at many of the programs. Therefore, the pretests contained three short sections consisting of six questions in each of the first two sections and ten questions in the third and final section. Each section was based on a five point Likert-type scale. The main body of the pretest was kept to close-ended questions for time, however there was additional space on the back of the pretest for the participants to write in any comments.

The first section, included questions regarding the participants yard and garden management practices, specifically those relating to pesticide and fertilizer use. The second section asked the participants to indicate their opinion concerning certain groundwater quality issues. These questions delved into such matter as how they felt their particular actions affect groundwater, how they discard leftover or unused pesticides and fertilizers, as well as if they feel their actions affect other peoples groundwater quality. The third section was measured how much ownership and empowerment the participants had regarding the groundwater quality issue. Questions such as if they felt as an individual they can make a difference in groundwater quality and how willing they were to spend additional money to enhance their environment to better protect groundwater quality. In addition, questions regarding current pesticide and fertilizer practices, and how confident the participants were in their environmental practices was a portion of the third section.

In order to obtain comparable data for impact analysis of HAS, the posttest contained the same sections with the same questions as the pretest. In addition, the

questions that were eliminated in the pretest for time, were added back into the posttest, along with a fourth section. The fourth section was developed post hoc in order to gain a better understanding of HAS participants and their level of pesticide and fertilizer uses prior to the HAS intervention. This came into development after discussion and analysis of the pretest results.

Collection of Data

The pretest and posttest were developed using information gathered from observations of HAS programs by the researcher as well as input from the Americorps agents, HAS experts, as well as prior studies and a pilot test.

There were nineteen Americorps agents providing HAS programs across Michigan. Each agent was sent twenty-one questionnaires, consent forms, and instructions for administration. They were directed to administer the pretests over the course of the month of March, 2001. The deadline, however, had to be extended an additional month due to low return rates. Over the course of the two month period, the Americorps agent was to administer and collect the pretests at each adult group program they presented. No one on ones, or children groups were allowed due to timeliness in gathering a sample size and the fact that programs delivered to children are different than those delivered to adults.

The HAS outreach programs were to be presented as they had been previously, each Americorps agent was to provide the presentation in their normal individualistic fashion. This is a very important factor because since the inception of HAS in Michigan, there has not been a set method that all the Americorps agents use. At the beginning of

the year, the Americorps agents attend a three-day seminar, which provides them with ideas as to what may work, or what has worked in the past. They also have access to the files of the previous educator, which may include visual aids, handouts, and so on.

The only change in the normal routine of the Americorps agents is the fact that prior to each of their presentations they distributed the consent form and pretest to all participants and allowed time for them to finish prior to beginning their presentation. The consent forms and pretests were collected directly after the participants completed them prior to the start of the presentation.

The posttests were sent by mail following the end of the pretest distribution period. There may be some differences in responses due to the time span between the first pretests collected and the last, because of the unforeseen extension of a second month. Those participants that attended an HAS program near the beginning of the first pretest collection month had a considerable amount of time pass between the pretest and posttest versus those participants that attended an HAS program near the end of the second pretest collection month.

The posttest consisted of three mailings that were mailed to the participants of the HAS program who indicated voluntary participation in this study. The first mailing included a cover letter, the questionnaire, a self addressed stamped return envelope, and a bag of tea for incentive. Approximately two weeks after the first mailing, a reminder postcard was sent to the non-respondents urging them to return the questionnaire. The third and final mailing was sent to those who had not yet responded and contained a new cover letter, questionnaire, return envelope, and as an added incentive, an entry form to win an MSU sweatshirt. For the sweatshirt entry form to be considered valid, the

respondents had to have the questionnaire filled out along with the entry form and returned by a specific date.

Altogether, a total of 146 completed and usable pretests were collected. There were ten surveys that were returned to the researcher by a person other than an Americorps member, eleven pretests that were returned after the cut off date, and twenty-two respondents did not fill out a consent form. This brought the total of posttests that were able to be sent out to 124. With 79 posttests returned, there was a return rate of 64%. One posttest was returned incomplete, one was returned having been filled out, but by a person who indicated they had not gone to a Home*A*Syst program, and six packets that were returned undeliverable.

Analysis of Data

The data in this study were analyzed using the Statistical Package for the Social Sciences (SPSS). The data were analyzed using frequencies, percentages, means, standard deviations, and t tests. Any incomplete questions, or confusing marks were treated as missing values and were not included in the statistical analysis.

Limitations

The researcher recognizes the following limitations of this study. 1) This study was self-selected on the part of the participants, therefore, there could not be a random sample of the population. HAS is a voluntary program, only those that are interested in the program are those that will come. 2) These findings can only be generalized to those people who participated in this study. Because of the unique nature of each individual

program, as well as the fact that the Americorps agents will not be the same, there cannot be any generalizations to other programs. 3) The low number of pretest questionnaires did not allow for a very large sample, thus the statistical power is also low. As was previously stated, due to the voluntary nature of the program, it was unforeseeable how many programs would be offered and how many people would attend these programs. Consequently, over the course of the two month pretest collection period, few adult group presentations were administered that included the consent form and pretest. 4) Because HAS is a voluntary program, those that already have a propensity towards learning about the environment and groundwater quality could be the majority of those that attend the program. 5) The educational intervention provided by the HAS programs may have varied. Some of the programs are limited to twenty minutes in length, others can last as long as two hours. If a particular program is limited to a short time period, the five to seven minutes needed by the participants to fill out the consent form and pretest is valuable time that is lost by the Americorps agent for education. Accordingly, the longer the allotted program time, the more in depth the information provided can be thus providing a better chance for education. 6) Because the HAS program may be more established in a particular area, more pretests could be sent in from those areas, not allowing for an overall representation. From year to year the number of Americorps agents varies, causing some areas in Michigan to have more consistent representation than other areas. Due to this a more developed program could provide more programs thus producing more pretests causing a skewed representation of the areas in Michigan.

CHAPTER IV

FINDINGS

The purpose of this study was to discover if the Michigan Home*A*Syst program was developing groundwater education in homeowners, as well as to learn what type of audience is attending the HAS programs. The data was collected from 146 pretests that were handed out directly to HAS participants, and 79 posttests, received through mail questionnaires. The posttests were collected from the same group of individuals who participated in the pretest. The pretests contained 22 questions, all close-ended, and the posttests contained 42 questions, including the questions from the pretest and some open-ended questions as well. The surveys contained questions that would get to the understanding of yard and garden management practices, opinions about the environment and how the participants interact in that environment, and finally, questions to help understand how much empowerment and ownership a participant feels about the groundwater quality issue.

Findings from the Pretest

Yard and Garden Management Practices

The first section of the pretest asked six questions regarding the respondent's yard and garden management practices in association with pesticides and fertilizers. Respondents were asked on a 1-5 scale (with 1 being Never, and 5 being Always) to indicate the extent to which they follow certain yard and garden management practices. For all six questions, the responses were a scale mean of 4.09 out a five-point scale. This

suggests that the majority of the participants already use pesticide and fertilizer practices that minimize risks to groundwater quality (see Table 1).

Table 1. Pretest responses on yard and garden management practices

		% Responding				
Survey Statements	(N)	Never (%)	Rarely (%)	Sometimes (%)	Usually (%)	Always (%)
1. I identify the type of pest I am trying to control before applying pesticides or fertilizers.	141	6.4	3.5	14.2	36.2	39.7
2. I carefully read and follow the directions before applying pesticides or fertilizers.	141	4.3	.7	6.4	29.1	59.6
3. Any spills of pesticides or fertilizers are quickly cleaned up.	141	2.8	.7	12.1	22.0	62.4
4. I try to control pests with limited amounts of chemicals.	138	2.9	3.6	10.1	33.3	50.0
5. All leftover pesticides and fertilizers are stored in safe containers.	139	2.2	3.6	14.4	25.2	54.7
6. I take unwanted and unused pesticides to a local, safe disposal site.	135	17.8	17.0	15.6	20.7	28.9

Scale mean = 4.09, Standard Deviation = .43

As shown in Table 1, the question regarding taking unused or unwanted pesticides to a local, safe disposal site is the only question that the respondents showed a slightly negative response. Almost one third of the respondents indicated that they never or rarely take their unwanted or unused pesticides to a local disposal site, with only 28.9% percent indicating that they always do. In addition, the overall response rate of 135 was a bit lower than the other questions. This, along with the strong never and rarely responses indicates four possibilities. The respondents do not have unwanted or unused pesticides to discard, they do not know where a local disposal site is located, they were unaware of

such a disposal for pesticides, or they do not care to take their unwanted or unused pesticides to a disposal site. Overall, questions one through five all show that a majority of the respondents use safe, pro environmental pesticide and fertilizer practices.

Groundwater Quality

In section two, the participants were asked to indicate their opinions about particular groundwater quality issues. The scale consisted of six statements. Again, the scale mean was high at 4.09 on a five-point scale with a majority that they were likely to "very likely" to act or know how to act in a pro-environmental fashion (see Table 2 below).

Table 2. Pretest responses to opinions of groundwater quality issues

Survey Statements	(N)	% Responding				
		Very Unlikely (%)	Unlikely (%)	Undecided (%)	Likely (%)	Very Likely (%)
7. Do you act in the same manner towards groundwater quality at work as you do at home?	134	3.0	6.7	14.9	32.8	42.5
8. Do you think your neighbors groundwater quality can be affected by your behavior?	141	2.8	6.4	7.1	19.1	64.5
9. Do you feel that actions you take towards groundwater quality will make a difference?	142	3.5	5.6	8.5	33.1	49.3
10. Do you feel that you would know how to get your soil tested?	143	4.2	11.9	7.7	24.5	51.7
11. I know how to safely discard my leftover or unused pesticides and fertilizers.	143	4.9	14.7	13.3	30.1	37.1
12. A take home groundwater assessment booklet would help me to identify groundwater quality risks.	142	2.8	4.9	11.3	36.6	44.4

Scale mean = 4.09, Standard Deviation = .19

In correlation with question six in section one "I take unwanted and unused pesticides to a local, safe disposal site", question eleven in section two asked if the participants know how to safely discard their leftover pesticides. This question yielded a somewhat different perspective than did question six. A majority (67.2%) stated that they do know how to safely discard their pesticides whereas, as stated above, only 49.6% of the respondents indicated that they do take their unwanted or unused pesticides to a local, safe disposal site. This response eliminates the conclusion that the respondents do

not know how to safely discard their unwanted or unused pesticides, however it can still not be concluded as to how they discard the pesticides.

Overall, a majority of the respondents indicated that they know how to get their soil tested (76.2%), felt that their actions would affect their neighbors groundwater quality (83.7%), felt that their individual actions would make a difference towards groundwater quality (82.4%), and most respondents acted in the same manner at work towards groundwater quality as they do at home (75.3%).

Opinions on Empowerment and Ownership Issues

Section three took a look at empowerment and ownership issues. The questions attempted to find out how knowledgeable the respondents felt they were about "Clean Sweep" sites as well as the relationship between excess nitrogen in the soil and water quality. Also, it was attempted to determine if the respondents felt that they could make a difference in overall groundwater pollution as an individual. The respondents were asked whose concern groundwater contamination is concerning private wells, and also if they felt they would spend additional money in order to make changes to better protect groundwater.

Once again, the scale mean was high at 3.89 on a five-point scale (with 1 being Strongly Disagree and 5 being Strongly Agree). Although most respondents answered that they felt they could make a difference in groundwater quality as an individual and that they were somewhat knowledgeable about pesticide and fertilizer use, it is still unknown how the respondents actually do use pesticides and fertilizers and what they believe makes a difference in groundwater quality. Therefore, it cannot be determined if

in fact the correct ways to minimize risks to groundwater are actually those practices that are currently being followed (see Table 3 below).

Table 3. Pretest responses on empowerment and ownership issues.

Survey Statements	(N)	% Responding				
		Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
13. I tend to hold environmental quality as important as economic development issues.	142	3.5	5.6	14.8	35.9	40.1
14. The ways I take care of my lawn and garden can have a direct effect on the quality of local groundwater.	140	2.9	5.0	6.4	39.3	46.4
15. When it comes to taking care of my yard, I am confident in my ability to apply fertilizers and pesticides in ways that minimize threats to water quality.	138	1.4	9.4	15.2	47.8	26.1
16. I am knowledgeable about Clean Sweep sites.	131	16.0	23.7	40.5	13.7	6.1
17. There is little an individual can do to stop water pollution	141	38.3	39.0	6.4	10.6	5.7
18. Water pollution is usually the result of an accident that cannot be prevented.	143	41.3	40.6	6.3	7.7	4.2
19. Groundwater contamination is only a concern for people whose water source is a private well.	141	53.2	31.9	7.1	4.3	3.5
20. I understand the relationship between excess nitrogen in the soil and water quality.	142	3.5	8.5	31.0	33.8	23.2
21. I worry about the safety of my drinking water.	143	2.8	9.1	13.3	34.3	40.6
22. I would be willing to spend additional money to make changes in the way I take care of my yard in order to better protect groundwater.	142	3.5	4.2	20.4	43.0	28.9

Scale mean = 3.89, Standard deviation = .45

The question regarding how important the respondents feel environmental quality is as compared to economic development yielded a strong response towards agree and strongly agree with 76% of the responses. When asked whether or not the respondents felt that they knew that the ways they take care of their lawn and garden can have a direct affect on the quality of local groundwater, again the responses indicated that the majority (85.7%) either agreed or strongly agreed. In addition, 73.9% of the respondents indicated that they felt confident in their abilities to apply pesticides and fertilizers in way that minimize threats to water quality.

When the respondents were asked about water pollution, many of them responded favorably towards preventing water pollution. Over 38% strongly disagreed when responding to the statement that there is little and individual can do to stop water pollution. In addition, 41.3% strongly disagreed to the statement that water pollution is usually the result of an accident that cannot be prevented. Out of the ten questions and statements in the empowerment and ownership section, the statement stating that groundwater contamination is only a concern for people whose water source is a private well garnered the strongest response with 53.2% stating they strongly disagree.

On an interesting note, 74.9% of the respondents indicated that they worry about the safety of their drinking water, and 71.9% indicated that they would be willing to spend additional money to make changes in the way they take care of their yard in order to better protect groundwater.

Finally, it is important to discuss that the statement regarding knowledge of Clean Sweep sites received the lowest number of responses with 131, and of those 40.5% were

neutral responses and only 6.1% strongly agreed that they were knowledgeable about Clean Sweep.

Respondent Comments from the Pretest

The following quotes are examples of comments from respondents prior to the HAS program about the questions in the pretest as well as related items.

> "It made me think a lot more on how I take care of our water. We all have to take care of our neighbors also we have to educate them and hope that they will listen. Thank you very much for taking the time."
>
> "Education is the key to water quality. Most people (city and rural) take their water quality for granted including myself. After this class, I will try to educate my family, friends, and neighbors. Thank you for opening my eyes!"
>
> "Pesticides bad, people good."

These quotes are all positive towards the environment, water quality, and pesticide/fertilizer use. Either those that felt negatively about these subjects did not feel that they wanted to take the time to write any comments, or those that chose to attend these voluntary programs were only people that feel education and groundwater quality are a good thing.

Findings from the Posttest

The response rate for the posttest was 64%. Although there were 146 returned and useable pretests, only 124 consent forms were signed and addressed for use in sending the posttests. Therefore, out of 124 posttests, 79 were returned.

Yard and Garden Management Practices

The first section of the posttest contained the same six questions as the pretest with an additional four questions; the additional questions were taken from the pilot test. The posttest contained more questions than the pretest because the researcher felt that the respondents would have more time to complete the posttest. Moreover, it is important to obtain as much information concerning the Home*A*Syst program as is feasible in order to provide valuable information for future development. The additional questions added to section one included statements pertaining to how frequently the respondents tested their soil for nitrogen, if they use other methods for weed control other than pesticides, and how they take care of their lawn.

Of the four questions not asked on the pretest, three were rated positively, with a majority selecting "usually" or "always" when asked about pro-environmental practices (see Table 4). However, the question regarding soil testing was rated low with 56.3% of respondents stating that they either "never" or "rarely" get their soil tested for nitrogen content.

Table 4. Responses to posttest on yard and garden management practices.

		% Responding				
Survey Statements	(N)	Never (%)	Rarely (%)	Sometimes (%)	Usually (%)	Always (%)
7. I test my soil frequently to identify nitrogen content.	71	33.8	22.5	32.4	8.5	2.8
8. I manually pull weeds from my lawn or garden.	75	0	2.7	17.3	40.0	40.0
9. I rake, bag or remove my lawn clippings from the lawn.	67	17.9	22.4	23.9	14.9	20.9
10. I mow my lawn regularly to that the grass length usually stays around 2.5-3.0 inches high.	68	0	1.5	11.8	47.1	39.7

Those respondents that indicated that they "never" or "rarely" remove their lawn clippings from their lawn are those that are practicing pro-environmental behavior. By leaving the clippings, the lawn acquires nutrients.

Comments about Lawn and Garden Management Practices

In the posttest, the researcher provided an area for the respondents to make comments for each section. The following are comments for section I:

> "I prefer not to use pesticides and fertilizers whenever possible."
>
> "We had been cutting our grass too short. Now we have changed to 2 ½ - 3 inches! We pull tons of weeds and then compost them.
>
> "I don't really dispose of pesticides. What little we have gets used. This makes me aware that I should check the labels for expiration dates."

Groundwater Quality

Section two of the posttest also included all of the same six questions from the pretest as well as six additional questions. These additional questions related to the respondents behavior and how they felt it affected their groundwater quality. Other questions related to safety of future groundwater and knowledge of risks around their home that may have a negative affect on groundwater.

Over one-half (53.9%) felt that their behavior was not likely to be harmful to groundwater quality. They also felt confident that they knew what risks there were around their home that may have a negative affect on groundwater, over 81% indicated they knew their risks. On the other hand, almost three fourths (74.1%) of the respondents felt that they would have to worry about the likelihood of limited amounts of groundwater within the next ten years, and over one half (50.7%) indicated that at some

point they feel getting clean, fresh water for themselves and their families will be a valid concern (see Table 5).

Table 5. Responses to posttest questions on groundwater quality issues.

		% Responding				
Survey Statements	(N)	Very Unlikely (%)	Unlikely (%)	Undecided (%)	Likely (%)	Very Likely (%)
17. Do you feel that some of your behaviors are harmful to groundwater quality?	76	17.1	36.8	19.7	21.1	5.3
18. Do you think that limited amounts of groundwater will be an issue within the next 10 years?	77	2.6	5.2	18.2	36.4	37.7
19. Will you and your family ever have to worry about getting clean, fresh water?	77	6.5	18.2	24.7	37.7	13.0
20. I know why it is a good idea to test my soil.	76	1.3	7.9	15.8	32.9	42.1
21. I know what risks there are around my home that has a negative affect on groundwater quality.	77	3.9	11.7	2.6	55.8	26.0
22. I plan to consult the take home groundwater assessment booklet.	75	1.3	6.7	17.3	50.7	24.0

Although as indicated above in section one of the posttest, a high majority (56.3%) of respondents do not get their soil tested, it is notable that in section two, the majority (75.0%) of the respondents indicated that they know why it is a good idea to get their soil tested.

Comments on Groundwater Quality

The following are comments from section II on the posttest regarding groundwater quality:

> "If some of my behaviors were harmful to groundwater quality it was due to ignorance. Now that I am more aware of certain things I don't plan on having behavior harmful to groundwater."
>
> "My current actions can be harmful if I am unaware of contributing factors. These actions may be more extensive than presently known and a serious groundwater problem, perhaps when it is very serious."
>
> " I will call the Macomb county hotline for info on safe pesticide disposal."

Opinions on Empowerment and Ownership Issues

Section three of the posttest, once more, contained the same ten questions as the pretest, with three additional questions. These questions pertained to whose issue and how important of an issue is groundwater. Also, there was as question regarding whether or not the respondents felt there is a relationship between surface and groundwater quality.

Table 6. Posttest responses on empowerment and ownership issues.

		% Responding				
Survey Statements	(N)	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
33. Safeguarding my drinking water from pollution is the responsibility of businesses and governments, not mine.	77	46.8	46.8	3.9	1.3	1.3
34. Groundwater quality is an important issue.	77	7.8	0	0	32.5	59.7
35. There is no relationship between surface water quality and groundwater quality.	77	55.8	39.0	1.3	0	3.9

A staggering 92.2% of the total respondents (n = 77) agreed or strongly agreed that groundwater quality is an important issue, with absolutely zero disagree and neutral responses. As well, 93.6% of the respondents believe that safeguarding their drinking water is not just the responsibility of businesses and governments in addition, well over half (55.8%) of the respondents understand that there is a relationship between surface water quality and groundwater quality.

Comments on Empowerment and Ownership Issues

The following are comments from section III from the posttest regarding empowerment and ownership issues:

> "I don't think one has to spend more in order to make changes, just be better educated."
>
> "Water quality is the responsibility of everyone, individuals, businesses, and government. But sometimes one individual can't do much or at least that's the way it feels."
>
> "Not very clear on Clean Sweep sites and I don't fully understand the relationship between excess nitrogen in the soil and water quality."
>
> "Keeping our lakes and rivers clean is everyone's job, not a few people."

*Participant Experiences Prior and During a Home*A*Syst Program*

The posttest contained an additional section that was added for several reasons. First, after reviewing the pretests it became noticeable that because of the voluntary nature of the HAS program, it may be that only those that already have a propensity towards the environment and groundwater quality are attending the programs. Therefore, section four contained questions that attempted to ascertain if the HAS participants came

into the program already having knowledge of pesticides and fertilizers (Figure 2), if they did where they obtained their knowledge, and if that knowledge changed the way they used pesticides and fertilizers (Figure 3). In figure two out of 73 responses, 58.9% indicated that yes, indeed they did receive training using pesticides or fertilizers prior to attending the Home*A*Syst program. Of those, 59.1% specified that their previous pesticide and fertilizer training had changed the way they used pesticides and fertilizers.

Figure 2.
Previous training regarding pesticide and/or fertilizer use. (N = 73)

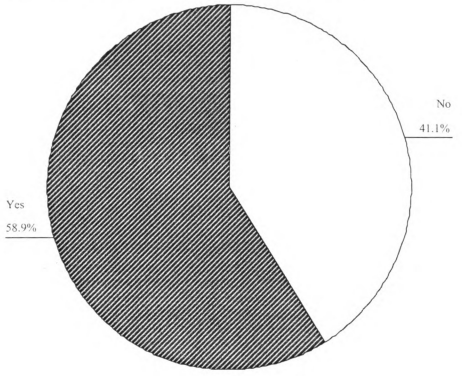
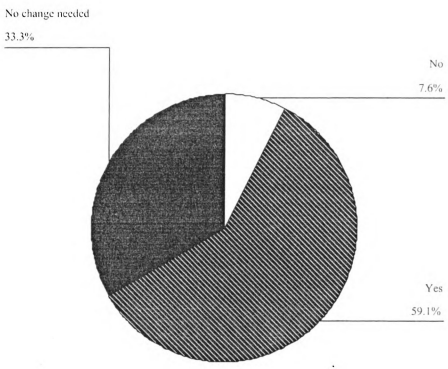


Figure3.
Change in pesticide and/or fertilizer use. (N = 67)



In addition, questions regarding whether or not knowledge about pesticides and fertilizers was addressed in the HAS program and their risks to groundwater are shown in figures 4a, 4b, and 5 respectively. As well, what type of activity sponsored the HAS program they attended such as a Lion's club, Master Gardener class is illustrated in figure six.

Figure 4a.
Pesticide and fertilizer education in the Home*A*Syst program. (N = 69)

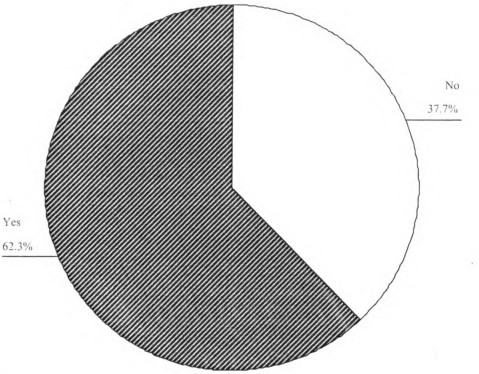
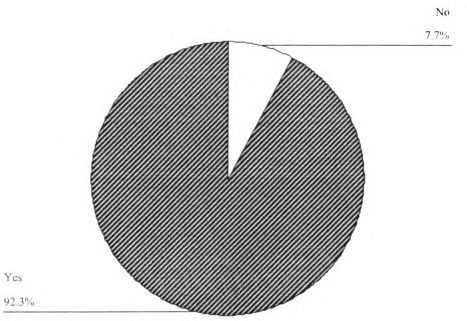


Figure 4a shows that although the focus of the HAS program is mainly risks to groundwater associated with pesticides and fertilizers, 37.7% of the respondents say that there was no mention of pesticide and fertilizer risks in the HAS program they attended. Although that percentage may seem low, the total number of respondents that answered that question was only 69. That equals just about 26 people out of the possible 69 that did not receive pesticide and fertilizer education. Figure 4b shows that even if pesticides and fertilizers are discussed, not all HAS programs discuss them in association with risks to groundwater.

Figure 4b.
Education of pesticide or fertilizer risks to groundwater. (N = 68)



Almost 8% of the HAS program participants did not receive any education of risks to groundwater in association with pesticides and fertilizers. This is troubling considering that this is the main focus of the HAS program.

Figure 5.
Change in pesticide and/or fertilizer use due to Home*A*Syst. (N = 67)

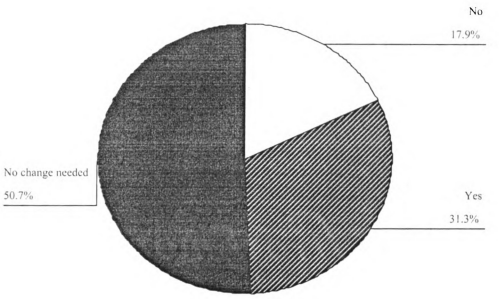
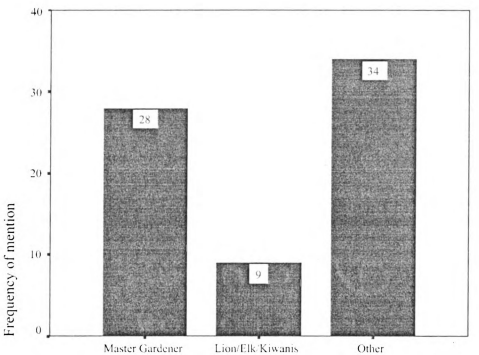


Figure five shows of those respondents that did receive the pesticide and fertilizer information, 50.7% claimed that they did not have to make any changes in their pesticide and fertilizer use, 31.3% said they did make a change in their use of these products, and 17.9% said that they did not make any changes in their pesticide and fertilizer use due to the HAS program. This indicates that over half of those that participate in the HAS programs already bring a certain level of knowledge in pesticide and fertilizer use.

The last question in section four of the posttest asked the respondents to indicate through which medium the HAS program was offered.

Figure 6.
Medium through which the HAS program was offered. (N = 71)



Respondent Overall Comments from Posttest

The following quotes are examples of overall comments of the HAS program the pretest, and the posttest as well as any other related items:

> "I've participated in HAS not only through MG (Master Gardener) programs but also garden club programs. Also, used a video borrowed from Extension office to show at a club meeting."

> "I see the HAS as an important program and am glad to have had some experience in it."

> "I think you should make sure that your presenters are reaching the right people. This presentation was given to a political science class."

"You are asking the wrong people on this. I don't work and I am not concerned about groundwater."

"People in general are ignorant to the effects of pesticides. No matter how many warnings are put out, they still seems to think that the chemicals will not affect them or ham the environment. Perhaps by presenting more natural types of pest prevention such as inviting birds and certain insects to the gardens and lawns along side of the warnings people may pay more attention."

Pretest and Posttest Comparison

Yard and Garden Management Practices

When comparing the findings from both the pretest and posttest, 97% of respondents on the posttest indicated that they "usually" or "always" identify the type of pest before applying pesticides, and 100% of the posttest respondents indicated that they "usually" or "always" carefully read and follow the directions before applying pesticides and fertilizers as well as quickly clean up any fertilizer and pesticide spills. There was also a slight change from 83.3% to 94.4% in those that indicated that they use limited amounts of chemicals to control pests. In addition, significant differences ($p<.05$) were noted on many of the questions.

Table 7. Comparison of responses on yard and garden management practices

Survey Statements		% Respondents					
		(N)	Never (%)	Rarely (%)	Sometimes (%)	Usually (%)	Always (%)
1. I identify the type of pest I am trying to control before applying pesticides or fertilizers.	Pretest	141	6.4	3.5	14.2	36.2	39.7
	Posttest	68	0	0	2.9	27.9	69.1
2. I carefully read and follow the directions before applying pesticides or fertilizers.	Pretest	141	4.3	.7	6.4	29.1	59.6
	Posttest	70	0	0	0	12.9	87.1
3. Any spills of pesticides or fertilizers are quickly cleaned up.	Pretest	141	2.8	.7	12.1	22.0	62.4
	Posttest	68	0	0	0	22.1	77.9
4. I try to control pests with limited amounts of chemicals.	Pretest	138	2.9	3.6	10.1	33.3	50.0
	Posttest	71	1.4	1.4	2.8	32.4	62.0
5. All leftover pesticides and fertilizers are stored in safe containers.	Pretest	139	2.2	3.6	14.4	25.2	54.7
	Posttest	69	1.4	2.9	7.2	20.3	68.1
6. I take unwanted and unused pesticides to a local, safe disposal site.	Pretest	135	17.8	17.0	15.6	20.7	28.9
	Posttest	61	9.8	11.5	14.8	31.1	32.8

Questions one, two, and three seemed to have the most change overall as they also have noticeable differences in the means.

Table 8. Noted differences when comparing pre and posttest yard and garden management practices

Survey Statements	Groups	(N)	Mean	Standard Deviation	t-value	Probability
1. I identify the type of pest I am trying to control before applying pesticides or fertilizers.	Pretest	141	3.99	1.12	4.65	.000*
	Posttest	68	4.66	.54		
2. I carefully read and follow the directions before applying pesticides or fertilizers.	Pretest	141	4.39	.96	4.06	.000*
	Posttest	70	4.87	.34		
3. Any spills of pesticides or fertilizers are quickly cleaned up.	Pretest	141	4.40	.93	3.16	.002*
	Posttest	68	4.78	.42		
4. I try to control pests with limited amounts of chemicals.	Pretest	138	4.24	.98	2.13	.035*
	Posttest	71	4.52	.75		
5. All leftover pesticides and fertilizers are stored in safe containers.	Pretest	139	4.27	.98	1.73	.085
	Posttest	69	4.51	.87		
6. I take unwanted and unused pesticides to a local, safe disposal site.	Pretest	135	3.26	1.48	1.79	.074
	Posttest	61	3.66	1.32		

* Significant Difference

Groundwater Quality

Posttest responses to statements about groundwater quality were similar to those of the pretest. However, one significant difference ($t = .018$, $p<.05$) regarding the question concerning the safe discarding of unused and unwanted pesticides. The posttest respondents indicated a higher knowledge level and would be "likely" to "very likely" to know how to discard of their unused or unwanted pesticides.

Table 9. Comparison of responses on groundwater quality issues

Survey Statement		N	Very Unlikely (%)	Unlikely (%)	Undecided (%)	Likely (%)	Very Likely (%)
7. Do you act in the same manner towards groundwater quality at work as you do at home?	Pretest	134	3.0	6.7	14.9	32.8	42.5
	Posttest	69	1.4	5.8	5.8	34.8	52.2
8. Do you think your neighbors groundwater quality can be affected by your behavior?	Pretest	141	2.8	6.4	7.1	19.1	64.5
	Posttest	77	2.6	2.6	2.6	24.7	67.5
9. Do you feel that actions you take towards groundwater quality will make a difference?	Pretest	142	3.5	5.6	8.5	33.1	49.3
	Posttest	76	1.3	2.6	5.3	40.8	50.0
10. Do you feel that you would know how to get your soil tested?	Pretest	143	4.2	11.9	7.7	24.5	51.7
	Posttest	77	2.6	6.5	11.7	27.3	51.9
11. I know how to safely discard my leftover or unused pesticides and fertilizers.	Pretest	143	4.9	14.7	13.3	30.1	37.1
	Posttest	77	2.6	5.2	7.8	40.3	44.2
12. A take home groundwater assessment booklet would help me to identify groundwater quality risks.	Pretest	142	2.8	4.9	11.3	36.6	44.4
	Posttest	76	2.6	5.3	9.2	46.1	36.8

Table 10. Noted differences when comparing pre and posttest groundwater quality.

Survey Statement	Group	(N)	Mean	Standard Deviation	t-value	Probability
7. Do you act in the same manner towards groundwater quality at work as you do at home?	Pretest	134	4.05	1.06	1.69	.092
	Posttest	68	4.31	.93		
8. Do you think your neighbors groundwater quality can be affected by your behavior?	Pretest	141	4.36	1.05	1.61	.247
	Posttest	76	4.53	.89		
9. Do you feel that actions you take towards groundwater quality will make a difference?	Pretest	142	4.19	1.04	1.22	.222
	Posttest	75	4.36	.81		
10. Do you feel that you would know how to get your soil tested?	Pretest	143	4.08	1.20	.82	.415
	Posttest	76	4.21	1.05		
11. I know how to safely discard my leftover or unused pesticides and fertilizers.	Pretest	143	3.79	1.23	2.38	.018*
	Posttest	76	4.18	.98		
12. A take home groundwater assessment booklet would help me to identify groundwater quality risks.	Pretest	142	4.14	.99	.39	.698
	Posttest	75	4.09	.96		

* Significant Difference

Opinions in this section did not change over the course of the study, except in the case of pesticide and fertilizer disposal. There is not a large change but a statistically significant one, and because of the fact that section two is similar in all other ways from pretest to posttest it is possible that this change may be due to the intervention.

Opinions on Empowerment and Ownership Issues

There were many differences in section three from pretest to posttest. Six out of ten questions had significantly different mean scores, and these were the questions regarding knowledge, empowerment, and ownership of the issues. Ninety percent of the posttest respondents versus 76% of pretest respondents indicated that they feel environmental quality is as important as economic issues. Almost all (97%) of the posttest respondents said they believe that lawn care can have an effect on groundwater quality versus 85% of the pretest respondents. On a different note, it seems that after a HAS program, people are less confident in their abilities to apply fertilizers and pesticides in ways that minimize risks to water quality. Nine percent of the posttest respondents versus only 1% of the pretest respondents indicated this.

Table 11. Comparison of responses on empowerment and ownership issues

Survey Statements	Group	(N)	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
13. I tend to hold environmental quality as important as economic development issues.	Pretest	142	3.5	5.6	14.8	35.9	40.1
	Posttest	77	0	0	10.4	28.6	61.0
14. The ways I take care of my lawn and garden can have a direct effect on the quality of local groundwater.	Pretest	140	2.9	5.0	6.4	39.3	46.4
	Posttest	76	1.3	0	1.3	47.4	50.0
15. When it comes to taking care of my yard, I am confident in my ability to apply fertilizers and pesticides in ways that minimize threats to water quality.	Pretest	138	1.4	9.4	15.2	47.8	26.1
	Posttest	76	0	0	9.2	52.6	38.2

16. I am knowledgeable about Clean Sweep sites.	Pretest	131	16.0	23.7	40.5	13.7	6.1
	Posttest	75	4.0	18.7	33.3	30.7	13.3
17. There is little an individual can do to stop water pollution.	Pretest	141	38.3	39.0	6.4	10.6	5.7
	Posttest	77	46.8	46.8	2.6	1.3	2.6
18. Water pollution is usually the result of an accident that cannot be prevented.	Pretest	143	41.3	40.6	6.3	7.7	4.2
	Posttest	76	56.6	39.5	2.6	1.3	0
19. Groundwater contamination is only a concern for people whose water source is a private well.	Pretest	141	53.2	31.9	7.1	4.3	3.5
	Posttest	76	61.8	36.8	1.3	0	0
20. I understand the relationship between excess nitrogen in the soil and water quality.	Pretest	142	3.5	8.5	31.0	33.8	23.2
	Posttest	75	4.0	12.0	20.0	44.0	20.0
21. I worry about the safety of my drinking water.	Pretest	143	2.8	9.1	13.3	34.3	40.6
	Posttest	77	2.6	16.9	13.0	39.0	28.6
22. I would be willing to spend additional money to make changes in the way I take care of my yard in order to better protect groundwater.	Pretest	142	3.5	4.2	20.4	43.0	28.9
	Posttest	74	2.7	6.8	18.9	45.9	25.7

Those that responded to the posttest seem to be more knowledgeable, empowered and have a higher sense of ownership of the issues when compared with the pretest scores. The largest overall change was on the question regarding how knowledgeable the respondents are about Clean Sweep sites. Forty-four percent of the posttest respondents indicated that they either "agree" or "strongly agree" that they are knowledgeable about Clean Sweep sites, versus only 20% of the pretest respondents. When that same question

is compared with questions six from section one regarding taking unwanted and unused pesticides to a local, safe disposal site, and question fifteen from section two regarding knowledge of how to safely discard leftover or unused pesticides and fertilizers, on the posttest, there is an indication that the name "Clean Sweep" does not hold any special meaning. Question six, whether or not the participant takes unwanted or unused pesticides and fertilizers to a safe local deposit site, indicated that a majority (over 50%) of both groups (pretest and posttest) do take unwanted or unused pesticides and fertilizers to a safe local disposal site. Question fifteen, knowledge of how to safely discard unwanted or unused pesticides and fertilizers, again indicated the majority know how to safely discard unwanted or unused pesticides and fertilizers. So, it is clear that a majority of those citizens that attend HAS programs know how and where to discard unwanted or unused pesticides and fertilizers, however, they do not recognize the "Clean Sweep" name as a place that they can dispose of those chemicals.

Table 12. Noted differences when comparing pre and posttest empowerment and ownership issues.

Survey Statement	Group	(N)	Mean	Standard Deviation	t-value	Probability
13. I tend to hold environmental quality as important as economic development issues.	Pretest	142	4.04	1.05	3.36	.000*
	Posttest	77	4.50	.68		
14. The ways I take care of my lawn and garden can have a direct effect on the quality of local groundwater.	Pretest	140	4.21	.97	1.87	.063
	Posttest	76	4.44	.66		

15. When it comes to taking care of my yard, I am confident in my ability to apply fertilizers and pesticides in ways that minimize threats to water quality.	Pretest	138	3.88	.95	3.38	.001*
	Posttest	76	4.29	.63		
16. I am knowledgeable about Clean Sweep sites.	Pretest	131	2.70	1.09	3.89	.000*
	Posttest	75	3.31	1.05		
17. There is little an individual can do to stop water pollution.	Pretest	141	3.94	1.18	2.66	.008*
	Posttest	77	4.34	.82		
18. Water pollution is usually the result of an accident that cannot be prevented.	Pretest	143	4.07	1.08	3.30	.001*
	Posttest	76	4.51	.62		
19. Groundwater contamination is only a concern for people whose water source is a private well.	Pretest	141	4.27	1.01	2.70	.007*
	Posttest	76	4.61	.52		
20. I understand the relationship between excess nitrogen in the soil and water quality.	Pretest	142	3.65	1.04	.05	.958
	Posttest	75	3.64	1.06		
21. I worry about the safety of my drinking water.	Pretest	143	4.01	1.08	1.72	.086
	Posttest	77	3.74	1.13		
22. I would be willing to spend additional money to make changes in the way I take care of my yard in order to better protect groundwater.	Pretest	142	3.89	.99	.31	.761
	Posttest	74	3.85	.97		

* Significant Difference

As indicated in table 12, the significant differences tend to correlate with the questions regarding the ownership and empowerment issues rather than those questions dealing with knowledge based responses, which are in effect entry-level variables. This phenomenon could again suggest that those people who were provided the HAS program

through non-environmentally based activities (Lions, Elk Clubs) responded to the pretest but were not inclined to respond to the posttest. This poses the question should then the entry-level variables be assumed as was previously stated in this study?

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

This study began its focus in a more grandeur style hoping to measure empowerment and ownership but instead ultimately the path lead to simply discovering a little bit about the HAS program. Having been in existence for over seven years, a review of where the program is now and where it is headed was needed. Because of this need, this study developed accordingly.

This study was guided by the following three objectives:

1. Assess what type of audience is being reached by the Home*A*Syst program.
2. Determine if pesticide, fertilizer, and groundwater messages are expressed through the program.
3. Identify whether or not the audience makes changes due to the HAS program messages.

Due to the voluntary nature of the program, the sample size was unknown until the pretests were returned during a specific time period. The self-selected sample from the programs came to 146 after the two-month collection period. Of those, only 124 had signed and addressed the consent form, all of which were sent a posttest.

Twenty-one copies of the pretest were sent out to each of the nineteen Americorps agents. They were to set aside five to ten minutes prior to their program to hand out the pretests and consent forms and allow the participants to complete them. The forms were then to be collected and sent back to the researcher.

The posttest consisted of three mailings. The first mailing consisted of a cover letter, the questionnaire, an addressed stamped return envelope, and a bag of tea for incentive. Approximately two weeks after the first mailing, a reminder postcard was sent to the non-respondents. The third and final mailing was sent to those who had not yet responded and contained a new cover letter, questionnaire, return envelope, and an entry form to win an MSU sweatshirt. The sweatshirt entry form was sent as an incentive and the respondents had to have the questionnaire filled out along with the entry form and returned by a specific date. All of the respondents that sent in a completed questionnaire, including those from the first and second mailing, will have a fair chance to win the sweatshirt.

Altogether, a total of 146 completed and usable pretests were collected. There were ten returned surveys that were handed out by someone other than an Americorps member, eleven pretests that were returned after the cut off date, and twenty-two respondents did not fill out a consent form. This brought the total of posttests to be sent out to 124. With 79 posttests returned, there was a return rate of 64%. One posttest was returned incomplete, one was returned having been filled out, but by a person who indicated they had not gone to a Home*A*Syst program, and six packets that were returned undeliverable.

Summary of Findings

The results suggest that HAS is indeed reaching those who already have a tendency to have environmental knowledge, specifically in relation to risks to groundwater in association with pesticides and fertilizers. Twenty eight respondents out

of seventy one stated that their HAS program medium was a Master Gardener program. A complete list of all the mediums can be found in the appendix.

Floyd J. Fowler, Jr. (1993) found that people with an interest in the survey subject matter will be more likely to return the surveys. In this study, it is conceivable that those who chose to respond to the posttest chose to do so because of their interest in the subject matter. The results showed that the posttest means were higher on almost every question, than those of the pretest. One assumption is that those who returned the posttest had a higher interest in the Home*A*Syst program contents. Another assumption could be that the HAS program is working.

The goal of the HAS program is to educate homeowners about the risks to groundwater quality in and around their home in relation to pesticide and fertilizer use. Objective two was to learn what types of messages were being delivered by the Americorps members in the HAS programs. Clearly, as shown by the data, a majority (62.3%) of the programs did cover pesticides and fertilizers, however, the fact that almost forty percent of the programs did not discuss pesticides and fertilizers, means that HAS is not reaching its goal of addressing risks to groundwater in association with pesticide and fertilizer use. In addition, of those respondents who indicated that there was pesticide and fertilizer discussion in the HAS program, 7.7% noted there was not any association of pesticide and fertilizer use with risks to groundwater. However, it must also be noted that out of 68 respondents 7.7% only equals approximately 5 people. If those five respondents happened to have attended an HAS program at the beginning of the two month pretest collection period, they may have forgotten some items that were discussed

during that program. Also, differences in teaching and learning styles could add to confusion as to what was being taught by the Americorps agent.

The third objective was to understand whether or not the program was making a difference, and although there was a tendency for the programs to get slightly off course, the fact remains that out of a total of 67 respondents, 31.3% of them made a change in the way they use pesticides and fertilizers and they attributed this change to the HAS program. The question remains, is that enough? Is it worth the money and the effort to reach 21 people over the course of a two-month period? Would the program change the minds of those that don't already have an environmental predisposition?

In addition to the third objective was to learn if there had been any changes in behavior between the pretest and the posttest, more specifically, did the HAS program make a difference. Although the data did show that there were significant differences between the pretest and posttest, due to the fact that it is very possible that those who were already interested in the environment and the HAS program, are the highest percentage of those that returned the posttest. When asked through which medium the HAS program was offered, the majority said the Master Gardener program, and the "Other" category was filled with many additional environmentally focused programs such as garden clubs, West Michigan Environmental Action Council (WMEAC), and a neighborhood workshop. Responses from non-environmentally focused mediums such as Lion, Elk, or Kiwanis clubs received only nine replies.

Over the course of reading through the open-ended comments, it became apparent that some of the survey participants might have actually gained some knowledge from the surveys. Although the "before and after" change in behaviors cannot be formally

determined, there were specific references made by the respondents that coincided with the survey material

Conclusions

Changes are inevitable. Over the course of this study it became clear that it is difficult to measure how much empowerment and ownership a person perceives of a particular issue if in fact the researcher cannot even measure knowledge levels. Although a small portion of the surveys contained questions regarding empowerment and ownership issues, the focus of this study shifted from empowerment and ownership perception towards a more basic look at the Home*A*Syst program. Who is attending the program, what type of knowledge do they already have concerning pesticides and fertilizers, is HAS "preaching to the choir" so to speak? These questions among others needed to be answered before an assessment of empowerment and ownership issues.

First, it was clearly identified that many of the HAS participants in this study came into the program with prior knowledge of pesticides and fertilizers. In addition, many of the participants also showed a propensity towards pro environmental behavior. Second, it also became apparent that HAS is a valuable program that did educate and change the way 31.3% of the participants use pesticides and fertilizers. However, as was discussed previously, many of the people that attended the HAS programs were those that had a predisposition towards pro environmental behavior. If it is the goal of the HAS program to focus its efforts towards changing behavior in only those homeowners that have a pro environmental focus, it seems that the program is well on it's way to achieving its goal. If, however, the goal is to target all homeowners in Michigan regardless of

environmental feelings, there is a lot of work to be done. Third, the HAS program does not provide a consistent message. Regardless of the target audience, the program should have a message that is clear and understood by everyone involved, the Americorps agents, the HAS coordinators, and the HAS participants. If the message is unclear at the beginning, then the outcome will be unclear as well.

Recommendations

*Recommendations for Home*A*Syst*

It is very difficult to get people motivated and interested in programs that they feel are not important. If it is the goal of the Home*A*Syst program to reach the average homeowner in Michigan a few changes need to be made. First, the fact that each of the Americorps agents can address each group differently, with their own tools, materials, and messages makes it very difficult for HAS to be as effective as it needs to be in order to reach the average Michigan resident. Because of the inconsistencies there cannot be any type of recognition of HAS by an average person. There is no clear, consistent message for people to associate HAS with groundwater quality education. Additionally, by allowing the Americorps agents the ability to make up their own materials, there cannot possibly be any type of control as to what message is being delivered.

Second, training provided to the Americorps agents needs change. There should be a more concise message about what is expected, what messages should be delivered, what the outcome of each HAS program should be, and who is their target audience. The training should also include ways to connect with the average Michigan resident, those

that may not have as much a tendency towards environmental education, as well as those already being reached.

Third, a mentor program should be developed. Americorps members are allowed to work for two years in the program. Each year in the Michigan Home*A*Syst program, a few of the Americorps agents return for a second year of service. If funding allows, the second year Americorps should be mentors for the first year Americorps. Each returning member should be there to answer questions, help in the development of programs, and provide overall assistance to the first year Americorps agents.

It is not known exactly why there was such a low pretest return rate. It is known however that the Americorps agents do work fulltime and a majority of their job is to deliver HAS programs. Although this study did not focus on programs for children under age eighteen, or one on one programs, for each of the Americorps agents to provide the researcher with twenty-one surveys within a month was a feasible task. Even so, the return date did have to be extended an additional month because of such a low return rate. The low return rate could be related to local support. Support at the local and state level needs to be expressed so that there is an awareness of any problems, progress, or any questions the Americorps agent might have.

Americorps agents need to return to the same participants in a timely manner to review and repeat the messages. Based on talking with the Americorps agents as well as observing some HAS programs, it is very infrequent that the same HAS participants are targeted again. This is key to having the participants make a change.

Recommendations for Further Study

Based on the findings of this study, these areas are in need of immediate research:

1. Who do the Americorps agents feel is their target audience and what do they believe are the core messages. By holding one on one meetings or focus groups, it can be quickly learned if the Americorps share similar educational needs and priorities as the goals of the HAS program in relation to target audience and core messages.

2. Who do the HAS coordinators feel is the target audience and what do they believe are the core messages. This is obviously the key to guiding the program and helping the Americorps understand what their role is in the Home*A*Syst program.

These are areas in need of ongoing and long-term research:

1. Continue to evaluate what types of people are attending the HAS programs. Identify if they already have a tendency towards environmental action.

2. Examine what types of messages the participants feel are being delivered in the HAS programs in order to understand if that coincides with the goals of the program.

3. After everyone involved with HAS (Americorps, MDA, MSUE) has a clear understanding of the goals and changes in the HAS program have been made, carry out another comprehensive needs assessment.

4. Once it can be established whether or not the program is reaching its new goals, identifying the levels of empowerment and ownership can then be used to assess what degree of impact that HAS program is having regarding behavior change.

Reflections

From this study, it was realized that the Home*A*Syst program has good environmental intentions. Although all involved worked diligently to make this a great program, there were some obvious problems. Understanding whom the audience is and what the core messages are is very important and over the course of the seven years that HAS has been in Michigan everyone involved began to envision their own audience and messages. Regardless, it is true that the program was still reaching people and awareness of pesticide and fertilizer risks to groundwater, among other things, was increased.

The researcher is happy to note that a committee was set in place to review the Home*A*Syst program. Realization of an overhaul came in part from a longitudinal baseline study assessing residential homeowners groundwater knowledge (the study noted no overall change), as well as in part from this particular study.

Hopefully, these results will help in the development of a long-term program that works to provide Michigan residents with the skills, knowledge, and commitment to understand and resolve the environmental challenges relating to groundwater quality.

APPENDICES

APPENDIX A

Human subjects approval letter

MICHIGAN STATE
UNIVERSITY

February 1, 2001

TO: Murari SUVEDI
409 Ag Hall
MSU

RE: **IRB# 01-035** CATEGORY: EXEMPT 1-C

APPROVAL DATE: January 25, 2001

TITLE: ASSESSING INTENTION OF BEHAVIOR CHANGE TOWARDS GROUNDWATER STEWARDSHIP IN ADULTS AFTER A HOME*A*SYST PROGRAM

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS approved this project.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.
REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.
PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/user/ucrihs

Sincerely,

Ashir Kumar, MD
Interim Chair, UCRIHS

AK: rj

cc: Kristin Linderman
409 Agriculture Hall MSU
East Lansing, Mi 48824

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/353-2976
Web: www.msu.edu/user/ucrihs
E-Mail: ucrihs@msu.edu

APPENDIX B

Pretest consent form

Instructions for Americorps

Questionnaire

Michigan State University Research Consent Form

By signing this form, you are acknowledging your voluntary participation in the Home*A*Syst study which includes participation in a pre and posttest. Any comments or opinions that you share will remain confidential, as references to your identity (name) will be deleted from any reports generated by these questionnaires.

These questionnaires will provide information that will be used for future Home*A*Syst development. The questions are regarding general knowledge, attitudes, and behavior towards groundwater stewardship. Each test should take approximately 15 minutes to complete.

Your participation in the questionnaires will provide valuable input for the development of the Home*A*Syst program. Through this program, Michigan homeowners and renters can gain valuable information to help them learn ways to promote voluntary groundwater pollution prevention in and around their home.

If you have any questions or concerns regarding your participation in this project, please feel free to contact:
University Committee on Research Involving Human Subjects (UCRIHS)
Dr. David Wright
246 Administration Building
Michigan State University
East Lansing, MI 48824-1046
(517) 355-2180

Print Name_____ Date_____

Sign Name_____

Address_____

Principle Researcher:

Kristin Linderman
406 Agriculture Hall
Michigan State University
East Lansing, MI 48824
(517) 355-6580 ext 234

Dear Americorps Agents,

For those of you that were at the restaurant Harpers after the pesticide/fertilizer program, a lot of this may be review. However, for those of you who were not able to attend, I wanted to make sure that everything was understandable. The following are answers to questions and comments about the HAS pretest from those Americorps agents during the Harpers discussion. I hope that this will address any questions you might have, if anyone does have a question or comment, please feel free to contact me.

1. Please **only** give the pretest to those people that are 18 and over.

2. Please encourage participants to sign and address the consent form and give it back to you with the pretest. This is how I plan to get participants addresses for the posttest. If for some reason someone does not want to put their address down that's okay, but please encourage them to still fill out the pretest.

3. I understand that during most programs you do not have a lot of time. If you could hand out the pretest and consent form to the participants as soon as possible maybe even while you're setting up, this may provide for more time. All pretests need to be filled out prior to your program.

4. The pretests will need to be filled out by your entire adult HAS participants form now until March 31, 2001. Please send your filled out pretests back to me as you get them if possible.

5. I have sent 21 questionnaires with consent forms stuffed in each to every Americorps agent. If you need more, please either contact me or feel free to make your own copies. Remember, due to University regulations, each person that fills out a survey **must** get a consent form.

6. I realize that some of you do other programs besides HAS, this pretest is only for the HAS programs. Also, please only give the pretest to group programs. One on one discussions cannot be added to this study because of the entirely different dynamic that happens in one on ones.

Don't forget to encourage all of your HAS participants to take the time to fill out this questionnaire. Make sure they realize their contribution is very important.

Thank you all for your effort, and again, if you have any questions at all, please contact me.

Sincerely,

Kristin Linderman
409 Ag Hall MSU
East Lansing, MI 48823
linderm1@msu.edu
(517) 355-6580 ext 234

Home *A* Syst

helping homeowners be active stewards of Michigan's water resources

Learning through Home*A*Syst: An Analysis of Groundwater Issues

Please return your completed survey to your Home*A*Syst Educator

The Department of Agricultural and Extension Education
MICHIGAN STATE UNIVERSITY
Agriculture Hall Room 409G
East Lansing, MI 48824

Directions: Answer each question as accurately as possible. The questions can be completed by checking the appropriate box. Your answers will be kept completely confidential.

SECTION I: Indicate the extent to which you follow these yard and garden management practices:	Never	Rarely	Sometimes	Usually	Always
1. I identify the type of pest I am trying to control before applying pesticides or fertilizers.	❑	❑	❑	❑	❑
2. I carefully read and follow the directions before applying pesticides or fertilizers.	❑	❑	❑	❑	❑
3. Any spills of pesticides or fertilizers are quickly cleaned up.	❑	❑	❑	❑	❑
4. I try to control pests with limited amounts of chemicals.	❑	❑	❑	❑	❑
5. All leftover pesticides and fertilizers are stored in safe (i.e. spillproof, child resistant) containers.	❑	❑	❑	❑	❑
6. I take unwanted and unused pesticides to a local, safe disposal site.	❑	❑	❑	❑	❑

SECTION II: Indicate your opinion about the following groundwater quality issues:	Very Unlikely	Unlikely	Undecided	Likely	Very Likely
7. Do you act in the same manner towards groundwater quality at work as you do at home?	❑	❑	❑	❑	❑
8. Do you think your neighbors groundwater quality can be affected by your behavior?	❑	❑	❑	❑	❑
9. Do you feel that actions you take towards groundwater quality will make a difference?	❑	❑	❑	❑	❑
10. Do you feel that you would know how to get your soil tested?	❑	❑	❑	❑	❑
11. I know how to safely discard my leftover or unused pesticides and fertilizers.	❑	❑	❑	❑	❑
12. A take home groundwater assessment booklet would help me to identify groundwater quality risks.	❑	❑	❑	❑	❑

SECTION III: Indicate your agreement/disagreement with the following environmental and water quality issues

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
13. I tend to hold environmental quality as important as economic development issues.	❑	❑	❑	❑	❑
14. The ways I take care of my lawn and garden can have a direct effect on the quality of local groundwater.	❑	❑	❑	❑	❑
15. When it comes to taking care of my yard, I am confident in my ability to apply fertilizers and pesticides in ways that inimize threats to water quality.	❑	❑	❑	❑	❑
16. I am knowledgeable about Clean Sweep sites.	❑	❑	❑	❑	❑
17. There is little an individual can do to stop water pollution.	❑	❑	❑	❑	❑
18. Water pollution is usually the results of an accident that cannot be prevented.	❑	❑	❑	❑	❑
19. Groundwater contamination is only a concern for people whose water source is a private well.	❑	❑	❑	❑	❑
20. I understand the relationship between excess nitrogen in the soil and water quality.	❑	❑	❑	❑	❑
21. I worry about the safety of my drinking water.	❑	❑	❑	❑	❑
22. I would be willing to spend additional money to make changes in the way I take care of my yard in order to better protect groundwater.	❑	❑	❑	❑	❑

Please use the space below to share any other thoughts or concerns you may have regarding the topics covered in this questionnaire.

Thank you for completing this questionnaire.

Your participation will provide useful information that will guide future groundwater quality education.

APPENDIX C

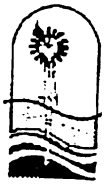
Posttest questionnaire

Cover letters

Postcard

Incentive

Home *A* Syst



helping homeowners be active stewards of Michigan's water resources

Learning through Home*A*Syst: An Analysis of Groundwater Issues Follow-up

The Department of ANR Education and Communication Systems
MICHIGAN STATE UNIVERSITY
Agriculture Hall Room 409G
East Lansing, MI 48824

Directions: Answer each question as accurately as possible. The questions can be completed by checking the appropriate box. Your answers will be kept completely confidential.

SECTION I: Indicate the extent to which you follow these yard and garden management practices:	Never	Rarely	Sometimes	Usually	Always	Not Applicable
1. I identify the type of pest I am trying to control before applying pesticides or fertilizers.	❑	❑	❑	❑	❑	❑
2. I carefully read and follow the directions before applying pesticides or fertilizers.	❑	❑	❑	❑	❑	❑
3. Any spills of pesticides or fertilizers are quickly cleaned up.	❑	❑	❑	❑	❑	❑
4. I try to control pests with limited amounts of chemicals.	❑	❑	❑	❑	❑	❑
5. All leftover pesticides and fertilizers are stored in safe (i.e. spillproof, child resistant) containers.	❑	❑	❑	❑	❑	❑
6. I take unwanted and unused pesticides to a local, safe disposal site.	❑	❑	❑	❑	❑	❑
7. I test my soil frequently to identify nitrogen content.	❑	❑	❑	❑	❑	❑
8. I manually pull weeds from my lawn or garden.	❑	❑	❑	❑	❑	❑
9. I rake, bag or remove my lawn clippings from the lawn.	❑	❑	❑	❑	❑	❑
10. I mow my lawn regularly so that the grass length usually stays around 2.5 - 3.0 inches high.	❑	❑	❑	❑	❑	❑

Comments About this Section:

_____

_____

_____

SECTION II: Indicate your opinion about the following groundwater quality issues:

	Very Unlikely	Unlikely	Undecided	Likely	Very Likely
11. Do you act in the same manner towards groundwater quality at work as you do at home?	❑	❑	❑	❑	❑
12. Do you think your neighbors groundwater quality can be affected by your behavior?	❑	❑	❑	❑	❑
13. Do you feel that actions you take towards groundwater quality will make a difference?	❑	❑	❑	❑	❑
14. Do you feel that you would know how to get your soil tested?	❑	❑	❑	❑	❑
15. I know how to safely discard my leftover or unused pesticides and fertilizers.	❑	❑	❑	❑	❑
16. A take home groundwater assessment booklet would help me to identify groundwater quality risks.	❑	❑	❑	❑	❑
17. Do you feel that some of your behaviors are harmful to groundwater quality?	❑	❑	❑	❑	❑
18. Do you think that limited amounts of groundwater will be an issue within the next 10 years?	❑	❑	❑	❑	❑
19. Will you and your family ever have to worry about getting clean,fresh water?	❑	❑	❑	❑	❑
20. I know why it is a good idea to test my soil.	❑	❑	❑	❑	❑
21. I know what risks there are around my home that has a negative affect on groundwater quality.	❑	❑	❑	❑	❑
22. I plan to consult the take home groundwater assessment booklet.	❑	❑	❑	❑	❑

Comments About This Section:

_____

_____

_____

SECTION III: Indicate your agreement/disagreement with the following environmental and water quality issues

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. I tend to hold environmental quality as important as economic development issues.	❑	❑	❑	❑	❑
24. The ways I take care of my lawn and garden can have a direct effect on the quality of local groundwater.	❑	❑	❑	❑	❑
25. When it comes to taking care of my yard, I am confident in my ability to apply fertilizers and pesticides in ways that minimize threats to water quality.	❑	❑	❑	❑	❑
26. I am knowledgeable about Clean Sweep sites.	❑	❑	❑	❑	❑
27. There is little an individual can do to stop water pollution.	❑	❑	❑	❑	❑
28. Water pollution is usually the results of an accident that cannot be prevented.	❑	❑	❑	❑	❑
29. Groundwater contamination is only a concern for people whose water source is a private well.	❑	❑	❑	❑	❑
30. I understand the relationship between excess nitrogen in the soil and water quality.	❑	❑	❑	❑	❑
31. I worry about the safety of my drinking water.	❑	❑	❑	❑	❑
32. I would be willing to spend additional money to make changes in the way I take care of my yard in order to better protect groundwater.	❑	❑	❑	❑	❑
33. Safeguarding my drinking water from pollution is the responsibility of businesses and governments, not mine.	❑	❑	❑	❑	❑
34. Groundwater quality is an important issue.	❑	❑	❑	❑	❑
35. There is no relationship between surface water quality and groundwater quality.	❑	❑	❑	❑	❑

Comments About This Section:

_____

_____

_____

SECTION IV: Please indicate which answer best describes your situation.

37. Prior to the Home*A*Syst program have you had training or past experience in using pesticides or fertilizers?

☐ Yes ☐ No

38. If yes, how did you obtain your experience or training?

_____

_____

_____

39. Has your previous training or experience changed the way you use pesticides or fertilizers?

☐ Yes ☐ No ☐ No Change Needed

40. Did you learn about pesticides or fertilizers in the Home*A*Syst program?

☐ Yes ☐ No

41. If yes, did you learn about pesticide or fertilizer risks to groundwater?

☐ Yes ☐ No

42. Did the Home*A*Syst information change the way you use pesticides or fertilizers?

☐ Yes ☐ No ☐ No Change Needed

43. Your Home*A*Sysprogram was offered through which of the following:

☐ Master Gardener

☐ Lion/Elk/Kiwanis Club

☐ Sierra Club

☐ Nursing Home

☐ Other _____

Please use the space below to share any other thoughts or concerns you may have regarding the topics covered in this questionnaire.

Thank you for completing this questionnaire.

Your participation will provide useful information that will guide future groundwater quality education.

May 17, 2001

(first name) (last name)
(street address)
(city), (state) (zip)

Dear (salutation):

The College of Agriculture and Natural Resources at Michigan State University is conducting a survey of the Home*A*Syst program in which you recently participated. The input we receive from you will be extremely valuable in evaluating the effectiveness of the HAS program and its effect on Michigan groundwater quality. With your feedback, the appropriate changes and recommendations may be made to improve the program.

Enclosed you will find a survey, along with an addressed stamped envelope, for you to fill out and return. Please complete the questionnaire and return it by June 8, 2001. Your participation in this survey is completely voluntary; however, your participation is crucial, as the results of this study are very important to future Home*A*Syst participants and our groundwater quality.

Your responses will remain completely confidential. The return envelope has an identification number that will enable us to check your name off the mailing list when the questionnaire is returned. The envelope will then be discarded. Your name will never be placed on the answer sheet or the questionnaire. In order to maintain your confidentiality, please do not write your name or return address on the survey. If you have any questions about the confidentiality or voluntariness of the survey you may contact Dr. David Wright at Michigan State University's Office of Research and Graduate Studies at (517) 355-2180.

We appreciate your involvement in this study, and urge you to fill out the questionnaire and return it by June 8, 2001. Thank you for your time.

Sincerely,

M. Suvedi, Ph.D.
Associate Professor
College of Agriculture and Natural Resources

Kristin Linderman
Research Assistant
Department of Agricultural & Extension Education

June 25, 2001

Dear Home*A*Syst Participant:

About four weeks ago, we sent you a survey seeking your opinions about the Home*A*Syst program in which you recently participated. The input we receive from you will be extremely valuable in evaluating the effectiveness of the Home*A*Syst program and thus, the appropriate changes and recommendations may be made for improvement.

As of today, we have not received your completed questionnaire. We realize you may not have had time to complete it, however we would genuinely appreciate hearing from you. In order for information from the study to be truly representative of your opinions, it is essential that each person in the sample return his/her questionnaire.

In the event that your questionnaire has been misplaced, a replacement is enclosed. Please complete the questionnaire and return by Friday, July 13, 2001. Your participation in this survey is completely voluntary and your response will remain completely confidential. The envelope has an identification number that will enable us to check your name off the mailing list upon return. Your name will never be placed on the questionnaire. In order to maintain your confidentiality, please do not write your name or return address on the questionnaire. If you have any questions about the confidentiality or voluntariness of the survey you may contact Dr. David Wright at Michigan State University's Office of Research and Graduate Studies at (517) 355-2180.

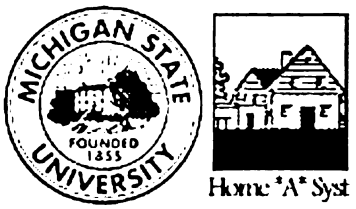
Additionally, a Michigan State University sweatshirt will be given away to a randomly selected respondent who fills out the enclosed form and mails it back with the completed questionnaire by July 13, 2001. Once again, your name on the form will not be associated with your questionnaire.

Your participation is crucial, as the results of this study are very important to the future of Home*A*Syst. We appreciate your involvement in this study, and urge you to fill out the questionnaire and return it immediately.

Sincerely,

Kristin Linderman
Research Assistant
College of Agriculture and Natural Resources

Center for Evaluative Studies
409 Agriculture Hall
Michigan State University
East Lansing, Michigan 48824-1039



Dear Survey Participant,

Two weeks ago a follow-up questionnaire seeking your opinions about a Home*A*Syst program you attended was mailed to you.

If you already returned the questionnaire to us, please accept our sincere thanks. If not, please do so today. We are especially grateful for your help because we believe your response will be very useful in the improvement of the Home*A*Syst program. If you did not receive a questionnaire, or if it was misplaced, you will receive another one in the next two weeks.

Sincerely,

Kristin Linderman
Research Assistant, College of Agriculture and Natural Resources

MSU Sweatshirt Giveaway

Make sure to complete your survey and giveaway form and return them by July 13, 2001 in order to be eligible to win!

Just fill out the form below and return with your completed survey.

Name_____

Address_____

_____

MSU Sweatshirt Giveaway

Make sure to complete your survey and giveaway form and return them by July 13, 2001 in order to be eligible to win!

Just fill out the form below and return with your completed survey.

Name_____

Address_____

APPENDIX D

Additional Tables

Appendix Table 1. How HAS participants obtained previous pesticide and fertilizer training.

	Frequency of response
Always read labels	1
County, family, read	1
Documentary programs on farmers pollution by animals they own	1
Educational training, personal experience	1
Environmentally concerned landscaper	1
Extensive gardening over many years and reading	1
Farming and BS in forestry and agriculture	1
Gardening classes	1
Graduate school M.S. biology work in greenhouses	1
Handouts from MSUE and read instructions	1
Home ownership for 30 years	1
I am a farmer and was aware of their uses	1
I farmed in Wisconsin and took courses to get a license	1
I sold farm chemicals and fertilizer for work and had training	1
Lifetime of farming and training seminars	1
Master Gardener	3
Master Gardener classes and reading labels	1
Master Gardener MSUE course	1
Master Gardener MSUE program	1
Master Gardener program	2
Master Gardener Program, reading in magazines	1
Master Gardener, packages from the store, got info from commercials	1
Master Gardening class	1
MSU Biological station, newspaper article	1
Neighborhood workshops	1
Past experience, following directions	1
Personal interest and reading	1
Read the labels	1
Reading books and labels	1
Reading the instructions	1
Reading the label	1
Reading, asking and classes	1
Speakers and pamphlets	1

Trained in hazardous material handling and disposal for work	1
Worked at Nursery	1
Worked at Public Health Dept.	1
Worked in a garden store and was trained	1
Working at a golf course	1
Total	42

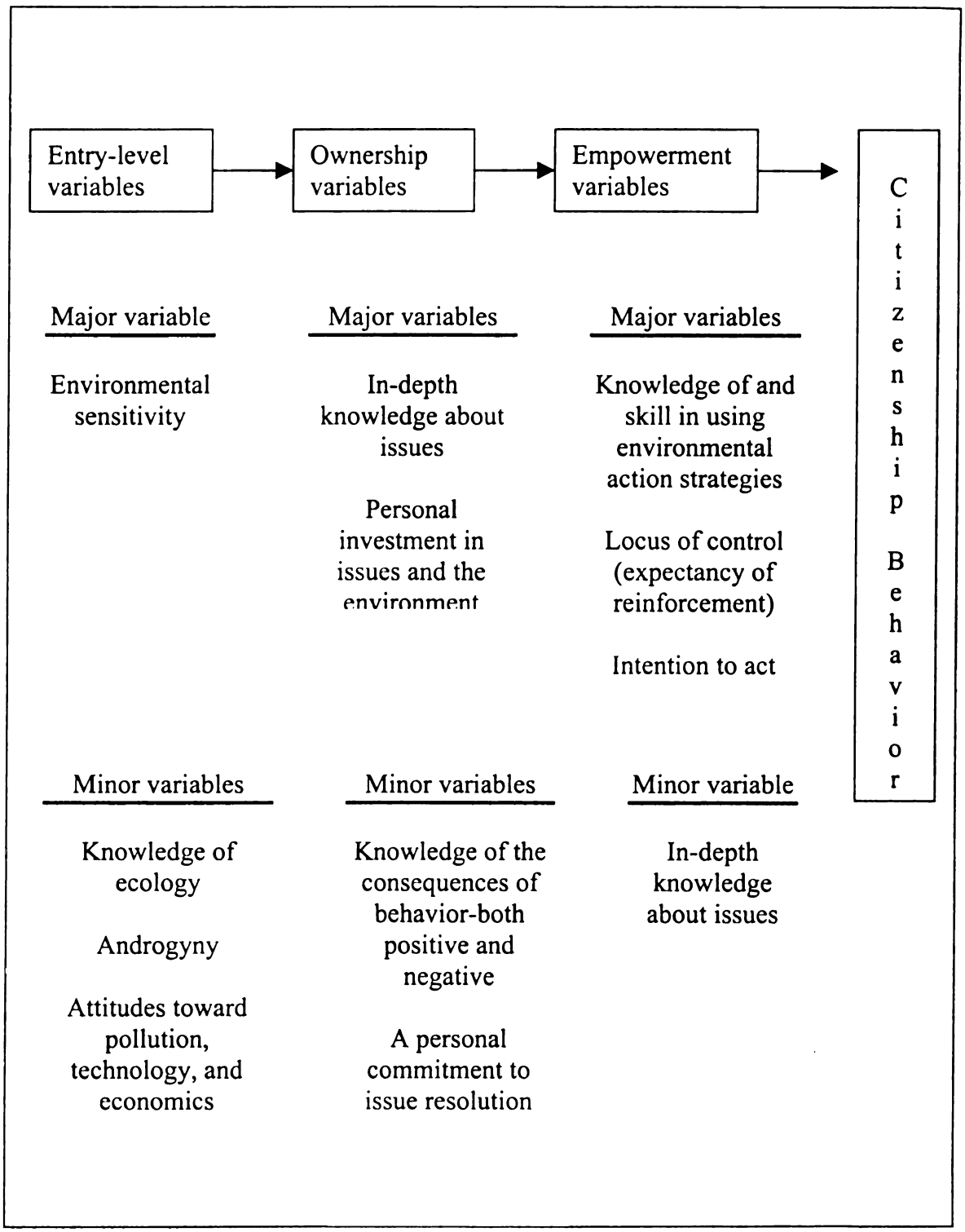
Appendix Table 2. Mediums through which the HAS programs were provided.

	Frequency of Response
River of Life speaker series	1
WMEAC	4
Talk with environmental guy	1
Extension Service	1
Garden club	4
County conservation district	1
Neighborhoods Inc. of Battle Creek	4
Home show	1
School	2
Church	1
MDEQ	1
Fair	1
MGSP	1
Central U.P. water resource	1
DNR flyer or US Forrest Dept.	1
Community outreach	1

APPENDIX E

Figure 1

Figure 1. Behavior flow chart: Major and minor variables involved in environmental citizenship behavior
(Hungerford and Volk, 1990)



REFERENCES

REFERENCES

Axelrod, L. J. 1994. Balancing personal needs with environmental preservation: Identifying the values that guide decisions in ecological dilemmas. Journal of Social Issues, 50(3):85-104.

Bandura, Albert. 1986. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ, USA: Prentice-Hall, Inc.

Borden, R. J. and A. P. Schettino. 1979. Determinants of environmentally responsible behavior. Journal of Environmental Education. 10(4):35-39.

Browner, C. M. 1995. Why environmental education?: It is critical to maintaining our quality of life. EPA Journal, 21(2).

Chafee, J.H. 1995. Preparing for the next century: Public understanding is critical. EPA Journal, 21(2).

Derksen, L. and J. Gartrell. 1993. The social context of recycling. American Sociological Review, 58:434-442.

Fowler, F. J. Jr. 1993. Survey Research Methods: Second edition. Newbury Park, CA, USA: SAGE Publications, Inc.

Funding: Michigan Groundwater Stewardship Program. (2001, July 24). [On-line]. Available: http://www.mda.state.mi.us/environm/groundwater/fund/index.html

Grob, A. 1995. A structural model of environmental attitudes and behavior. Journal of Environmental Psychology, 15(3):209-220.

Hammitt, J. P. 1995. Responsible environmental behavior: Metaphoric transference of minimum-impact ideology. Master's thesis. University of Montana.

Hines, J. M., H. Hungerford, & A. Tomera. 1987. Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. Journal of Environmental Education, 18(2):1-8.

Holsman, R. H. 2000. Groundwater awareness and behaviors among Michigan homeowners: An evaluation of homeowner programs 2000. Center for Evaluative Studies, East Lansing, MI.

Holsman, R., K. Linderman, D. Krueger, and M. Suvedi. 2000. Michigan citizens' knowledge, attitudes, and groundwater stewardship practices: A longitudinal study. Center for Evaluative Studies, East Lansing, MI.

Home Assessment System. 1999. Home*A*Syst: Home Assessment Guide. [Manual].

Hungerford, H. R. and T. L. Volk. 1990. Changing learner behavior through environmental education. Journal of Environmental Education, 21(3):8-21.

Lansana, F. 1993. A comparative analysis of curbside recycling behavior in urban and suburban communities. Professional Geographer, 45(2):169-179.

Magnus, V. J., P. Maritnez,, & R. Pedauye. 1997. Analysis of environmental concepts and attitudes among biology degree students. Journal of Environmental Education, 29(1):28-33.

Mrazek, R. 1993. Through Which Looking Glass? Defining Environmental Education Research. In Alternative Paradigms in Environmental Education Research . R. Mrazek (Ed.). Monograph Volume VIII. North American Association for Environmental Education. Troy, Ohio, 9-18.

National Environmental Education Advisory Council. 1996. Report assessing environmental education in the United States and the implementation of the national environmental education act of 1990. Prepared for Congress by the NEEAC. U.S. Environmental Protection Agency Environmental Education Division, Washington D.C.

National Environmental Education & Training Foundation/Roper Survey. 1997, May.

National Environmental Education & Training Foundation/Roper Survey. 1998, May.

Negra, C. and R. E. Manning. 1997. Incorporating environmental behavior, ethics, and values into nonformal environmental education programs. Journal of Environmental Education, 28(2):10-21.

Oskamp, S., M. J. Harrington, T. C. Edwards, D. L. Sherwood, S. M. Okuda and D. C. Swanson. 1991. Factors influencing household recycling behavior. Environment and behavior, 23(4):494-519.

Pitzer, R. and S. Meyer. 1996. Older learners and self efficacy. Minnesota Extension Service, University of Minnesota, St. Paul, MN. [On-line]. Available: http://www.cyfc.umn.edu/Parenting/Familylife/olderlearners.html

Pooley, J.A. and M. O'Connor. 2000. Environmental education and attitudes: Emotions and beliefs are what is needed. Environment and Behavior; Thousand Oaks, 32(5):711-723.

Ruskey, A. 1995. State Profiles in Environmental Education: The trend is toward comprehensive programs. EPA Journal, 21(2).

Salant, P. and D. Dillman. 1994. How to conduct your own survey. New York: John Wiley & Sons, Inc.

Savina, Gail. 1997. Affecting behavior change. Pollution Prevention Northwest. [On-line]. Available: http://www.pprc.org/pprc/pubs/newslets/news0397.html

Schultz, P. W., S. Oskamp and T. Mainieri. 1995. Who recycles and when: A review of personal and situational factors. Journal of Environmental Psychology, 15(2):105-121.

State of Michigan: Consolidate plan for 1995 executive summary. [On-line]. Available: http://www.hud.gov/cpes/mi/statemi.html

Suvedi, M., D. Krueger, A. Shrestha, and D. Bettinghouse. 2000. Michigan citizens' knowledge and perceptions about groundwater. Journal of Environmental Education, 31(2):16-21.

Trisler, C. E. 1993. Global issues and environmental education. ERIC/CSMEE Digest. (ED 359 051)

Vining, J. and A. Ebreo. 1990. What makes a Recycler? Environment and Behavior, 22(1):55-73.

Volk, T. L. and W. McBeth. 1997. Environmental literacy in the United States. North American Association for Environmental Education. Washington D.C.